The RUBBER AGE

January, 1944

TECHNOLOGY DEPT.

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JAN 2 6
DETROIT

BONDOGEN

BONDOGEN is used to good advantage in cements made of natural rubber or reclaim.

It seems to be even more valuable in cements made of GR-S. BONDOGEN smooths out the cement, retards jelling and reduces viscosity.

We suggest a trial of one pint to one quart of BONDOGEN to 25 gallons of solvent before adding the GR-S stock.

R. T. VANDERBILT CO., INC.
230 Park Avenue, New York City

Newsletter No. 1
JANUARY, 1944

Published by Rubber Chemicals Division of DUPONT

TRY NEOPRENE TYPE CG FOR MANY SPECIAL PRODUCTION ITEMS

NEOPRENE TYPE CG is closely related to the familiar Neoprene Type GN (GR-M) which is being so widely used as a general purpose synthetic to meet the requirements of many difficult service conditions. Like Type GN, Neoprene Type CG is a chloroprene polymer which produces vulcanizates having excellent physical properties and inherent resistance to oils, chemicals, heat, sunlight and normal aging or oxidation.

The sticks or rods of raw Neoprene Type CG are hard and stiff having a Shore Durometer hardness of over 75 in contrast with those of Type GN which have a hardness under 40. This difference is due to the inherent tendency of unvulcanized Type CG to freeze at normal room temperatures. Inasmuch as Type CG breaks down readily during mastication, despite its apparent original toughness, and since the property of freezing at nominal room temperatures is lost to a large extent during vulcanization this type of neoprene offers advantages over other types in certain manufacturing operations.

EXAMPLES—No two plants encounter exactly the same manufacturing problems even when engaged in producing the same product. However, it is believed a few typical illustrations of problems solved by the use of Neoprene Type CG may suggest a place where it may be helpful in your production efforts.

In the manufacture of molded mechanical goods having complicated shapes, a high percentage of defective parts sometimes results. Failure of the stock to completely fill the mold cavity is a common cause. One factor contributing to this may be insufficient back pressure built up by the stock due to the thermoplasticity of the stock itself. When such an occasion arises, the use of a compound based on the harder Neoprene Type CG having a higher softening point is indicated as a possible means of solving the problem.

In a static condition, when not being masticated or worked, unvulcanized compounds of Neoprene Type CG retain a considerable degree of their original stiffness at temperatures up to 50° C. Thus, preformed but uncured products in process retain their shape and withstand mechanical abuse much better than they would if made from other elastomers. This property offers obvious advantages in the manufacture of certain types of braided hose, for example.

Further, because properly compounded Neoprene Type CG stocks will vulcanize at temperatures as low as 50° C., complicated extruded shapes may be produced with a minimum of trouble from deformation during cure in open steam or hot air.

The amazing combination of unvulcanized stiffness and low curing temperature also suggests interesting possibilities of using Neoprene Type CG compounds in the manufacture of products, a part of which is made from relatively low melting point thermoplastics or elasto-plastics.

Neoprene Type CG vulcanizates are also of interest in applications requiring excellent resistance to deterioration by heat. Certain specialty mechanical goods, cut thread and even tire stocks are suggested as applications in which Type CG vulcanizates might be of value. In the accompanying table, comparing similar vulcanizates of Neoprene Types CG and GN (GR-M), the hot tear strength on the long overcure is particularly worth noting.

MINUTES CURE @ 35 PSI STEAM	Neoprene Type CG		Neoprene Type GN	
	60	360	60	360
Modulus @ 300% Elongation, psi	1425	1850	1250	1950
Tensile Strength @ Break, psi	4350	4525	4250	3950
Elongation @ Break, %	720	590	710	500
Hardness, Shore A	72	74	74	75
Tear Resistance @ 100° C., $\#$/in.	355	300	250	240

CEMENTS—Adhesive cements made from Neoprene Type CG have proved to be outstanding in a wide variety of services. Dry films from Type CG cements have high initial cohesive strength because of their unique property of freezing at room temperature. In addition, such cements are capable of vulcanizing at room temperature to produce non-thermoplastic bonds having the excellent physical properties and resistance to aging, oils and chemicals typical of neoprene vulcanizates.

DRUMS—Return neoprene latex drums promptly. We can't ship latex in paper bags and we won't have enough metal drums if latex users do not return them promptly. Furthermore, we can't buy more if a high percentage of the drums shipped are not returned to us.

RETARDER W—This scorch controller has proven to be just as effective in GR-S compositions as in rubber, especially with thiazole accelerators.

AQUAREXES—The Aquarex products are all sulfated higher alcohols and are in great demand as mold lubricants for synthetic rubber compounds as well as for dispersing and stabilizing agents for latex. The demand is so great that it is difficult to supply enough of any one type especially of Aquarex D. We wish to point out that Aquarex MDL Paste and Aquarex DN Paste are interchangeable with Aquarex D in all applications and, furthermore, they are more economical on a use and active ingredient basis.

COLORS FOR NATURAL AND SYNTHETIC RUBBER—Colors seem to be coming out of this wartime camouflage of olive drab and other dull shades and are being *required* to make new products visible and attractive. We have streamlined our dry powder colors to a select group from which any desired color can be made.

Back the Attack with War Bonds

DUPONT

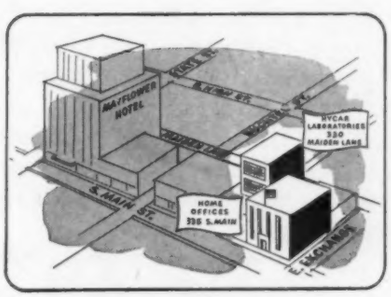
RUBBER CHEMICALS DIVISION

BETTER THINGS FOR BETTER LIVING . . . *Through Chemistry*

THE RUBBER AGE, published monthly by The Palmerton Publishing Co., Inc., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 250 West 57th Street, New York 19, N. Y. Entered as second class matter October 20, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $3.00 a year; Canada, $3.50; Foreign, $4.00. January, 1944, Vol. 54, No. 4

THE Hycar Customer Service Laboratory—typified by these trained men and women and its modern equipment—is available to you without cost. *Service* has always been its purpose and even in war times that service improves. Working with almost every rubber company and, through them, with concerns in the aviation, oil, chemical and many other industries, Hycar is daily developing new compounds and methods that can save you time, money and materials in serving your customers.

This Laboratory is yours. Here's a map to show how easily it is reached in Akron. Or—we'll bring our experience to you. We want to help. What can we do to serve you?



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LARGEST PRIVATE PRODUCER OF BUTADIENE TYPE

Synthetic Rubber

HYCAR CHEMICAL COMPANY • AKRON 8, OHIO

ONE OF EARTH'S *Great Treasures*

It is just a quarter of a century since the makers of TITANOX first extracted the titanium content from ilmenite commercially, and gave to the world its most opaque white pigments. In the intervening years TITANOX pigments have established a standard of usefulness in the field of opacity, whiteness and brightness which marks them truly as one of earth's great treasures.

Originally marketed for use in paints, the physical and chemical properties of TITANOX pigments soon found application in the whitening and brightening of rubber, paper, ink, leather, glass and a host of other manufactured products.

The success of these fine pigments in the making of white rubber goods from natural rubber became universal because of their unexcelled whitening effect. As TITANOX pigments have the greatest whitening effect on natural rubber, so also do they have on synthetic and reclaim.

Our Rubber Service Department will gladly cooperate in solving technical problems involving the use of white pigments.

TITANOX

REG. U.S. PAT. OFF.

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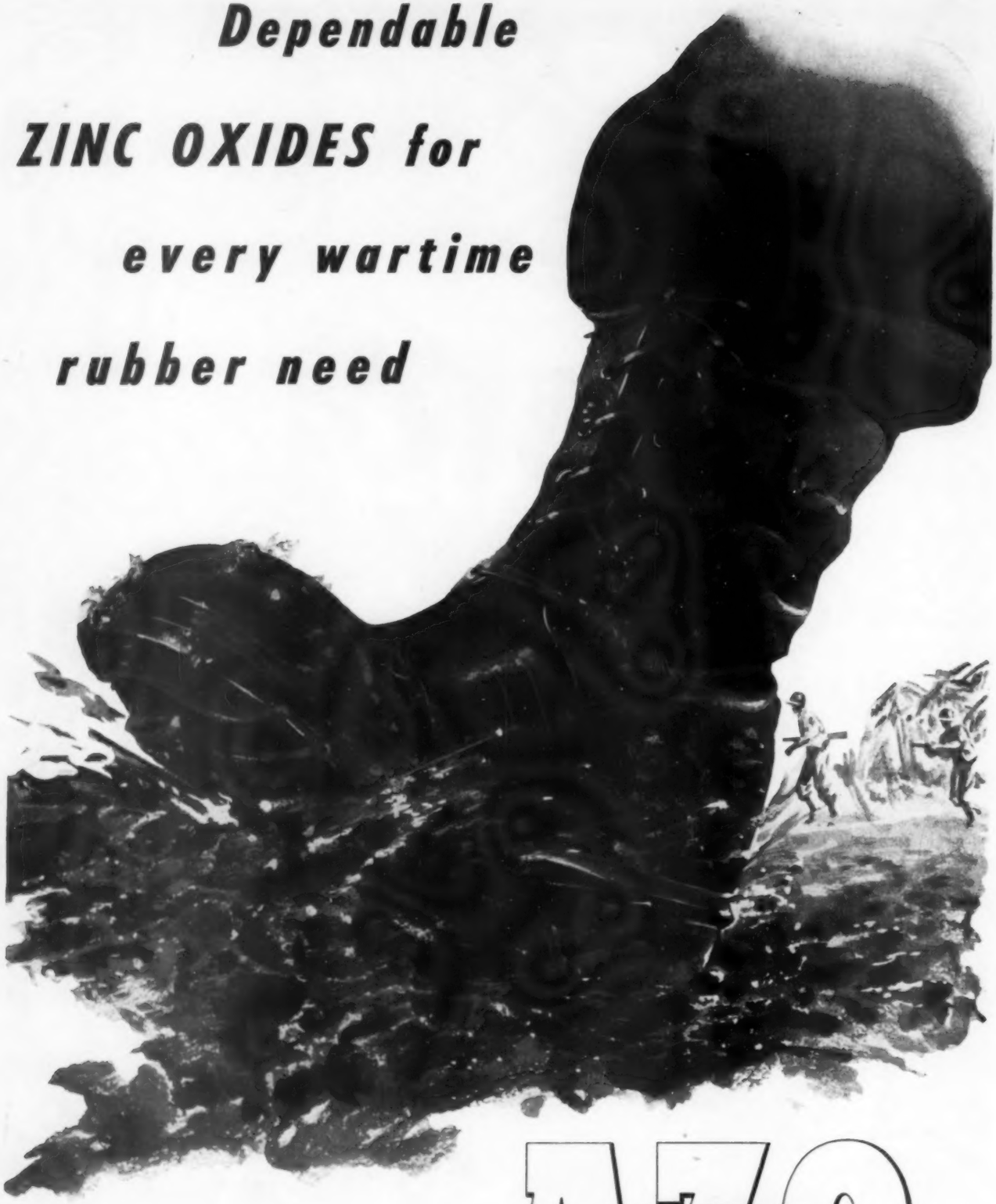
Dependable ZINC OXIDES for every wartime rubber need



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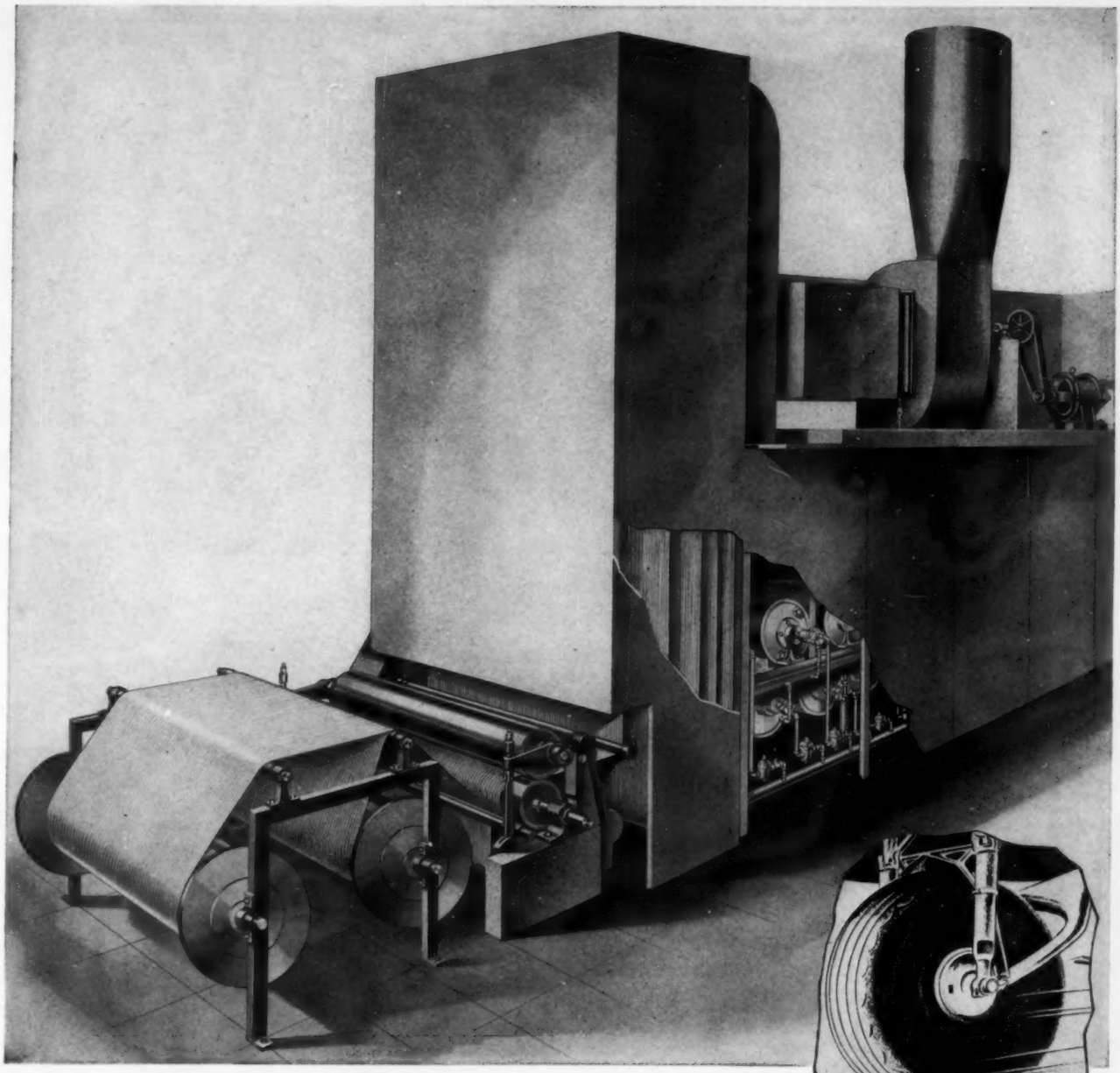

Minimum of Floor Space . . . The new Improved Butterworth Impregnating Machine for treating rayon tire cord with latex rubber solution, requires less space than any other machine of this type . . . and is fast and smooth in operation.

The rayon tire cord is impregnated with latex in the padder, then squeezed and dried in continuous process. The solution is fed into the padder box from an expansion tank. The amount of pick-up is controlled by hydraulic pressure applied to the padder rolls . . . The pressure being recorded by an instrument.

Before entering the heating flue, the surplus solution is removed from the material by means of high pressure nozzles. Butterworth Impregnating Machines operate at a speed of better than 25 yards a minute. Let us send you full details.

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Shown is the new Improved Butterworth Continuous Process Range for impregnating rayon tire cord with latex rubber solution. The range includes 2-Roll Micro-Set Padder, heated flue and dryer cans.

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versus

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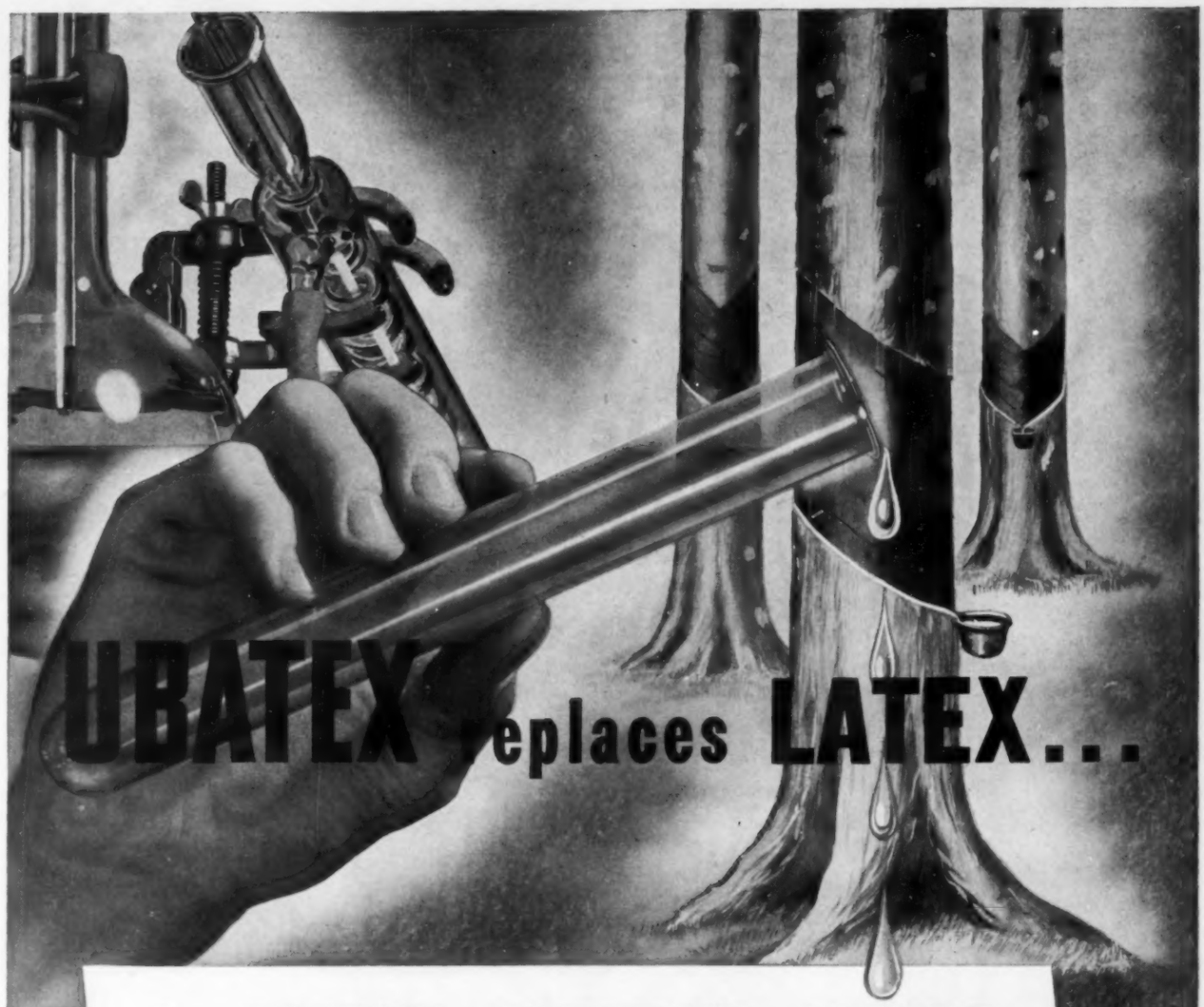
Originators of the Capitol Process Liner Treatment



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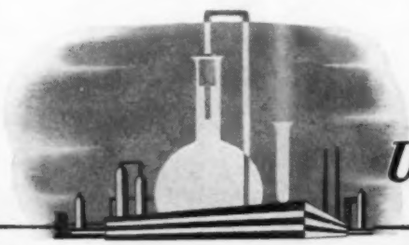
UBATEX is a completely synthesized latex (not a dispersed resin compound) that appears and handles similar to unvulcanized latex, dries to a tough, flexible film practically identical to a latex film, does not stain, is non-inflammable, and provides ageing and waterproof qualities definitely superior to latex — *the Ubatex film reaches maximum strength at room temperature, making vulcanization unnecessary.* Write today for free sample — describing materials and application methods involved.



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–Impart High Tensile Strength

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AMERICAN ALKYD INDUSTRIES, INC.
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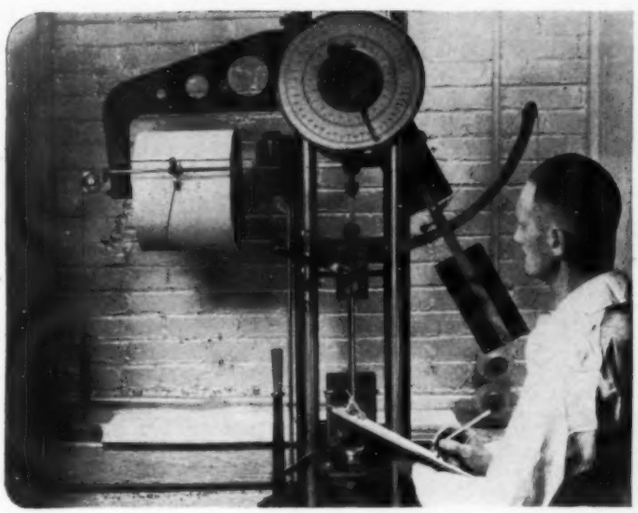
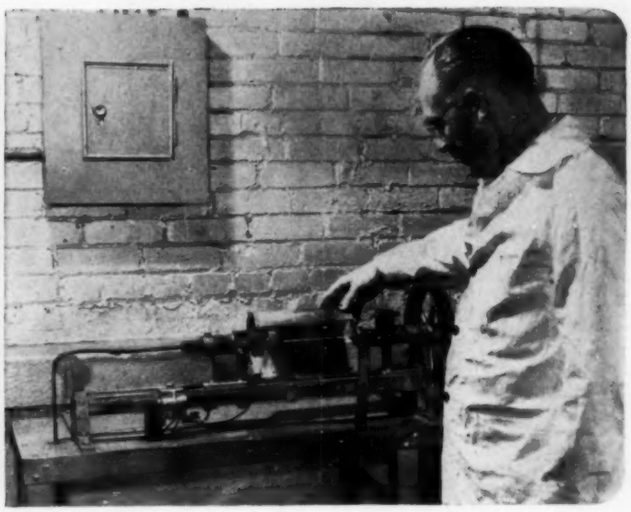
Where tire and hose wire get the third degree





THE time to catch trouble is before it starts. At least that's what we believe at National-Standard, and that's why we place so much importance upon one particular room in our plant.

That room is our testing and inspection laboratory and through it passes every single reel of National-Standard wire. Our procedure is to cut a piece of wire from *both ends* of each reel and subject it to our own rigid tests for tension, torsion and elongation. In all cases, our tests exceed customers' specifications and every reel must meet those tests or it does not leave our plant.

We've built our reputation for quality wire by paying more-than-usual attention to testing and inspection. It is one of the big reasons why people in the rubber tire and hose industries look to National-Standard as the kind of place where they get the very best that modern and efficient equipment, experience and engineering skill can produce in bead wire, braids and tapes.

★ ★ NATIONAL STANDARD Company ★ ★

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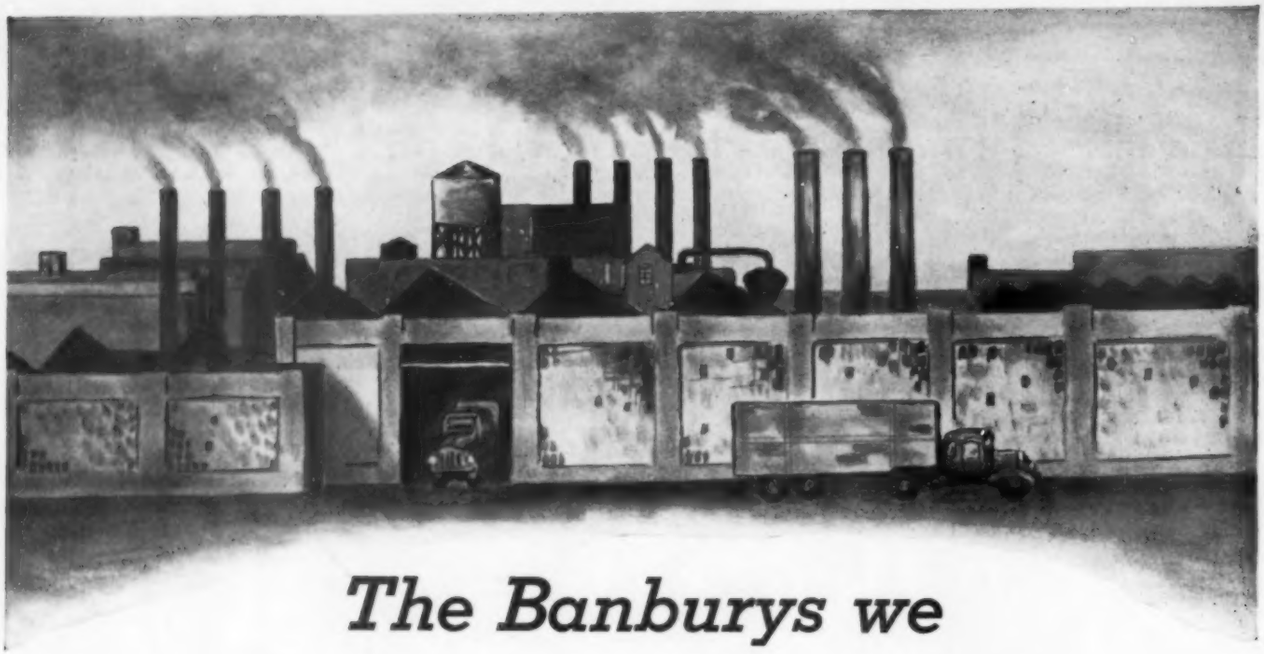

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These plants know the vital importance of *dependable skill* in Banbury rebuilding . . . They know from experience what precise workmanship and understanding of Banbury maintenance problems means in saving worry, excessive expense and trouble . . . For we have served many of these plants for years on all their Banbury problems. They have found in our service the assurance that Banbury efficiency can be quickly and effectively restored.

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simple as ordering lunch...

There's nothing confusing about the usual lunch menu today. You simply determine what you want and order it. We've made the picture on Para Coumarone Indene Resins just that simple. These resins are vitally important to rubber and plastics compounds because of the remarkable physical qualities they give the finished products . . . But there was confusion about the different types—and which would best serve a specific compound need . . . To help users we classified these resins into two groups, one group light in color, the other group dark. These two groups, each providing a range of melting points, will meet practically all production needs . . . Here is the simple method we have adopted —

STANDARD'S Para Coumarone Indene Precision Resins are identified by color and melting point as follows:

For Light Colored Compounds (color range 2-3)	For Dark Colored Compounds (color range 12-14)
PICCO 10	BUNAREX 10
PICCO 25	BUNAREX 25
PICCO 100	BUNAREX 100

Number indicates melting point centigrade (Ball and Ring method)

These six numbers (3 light and 3 dark) will meet practically every compounding need; however, if intermediate colors or melting points are required for special purposes we will continue to supply them.

These resins are manufactured by The Pennsylvania Industrial Chemical Corporation

Precision Chemicals for the Rubber Industry

STANDARD *Chemical Company*

General Offices: AKRON 8, OHIO

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● By a recent order of the Rubber Director, Thiokol Type A, FA, ST and all Thiokol Latices have been reclassified as general purpose synthetics for the purposes of Rubber Order R-1 as amended. The effect of this reclassification is to remove these Thiokol materials from the allocation list.

These materials may now be ordered by any purchaser for permitted uses as a general purpose synthetic within 60 days from the date of purchase order.

The only formality required is that the purchaser attach to his order a certification substantially in the form shown in the accompanying box, and signed by an authorized official.

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The undersigned hereby certifies to .....
(Insert name and address of seller)
and to the War Production Board that he is familiar with Rubber Order R-1 and that the types of Thiokol or Thiokol Latex listed in this purchase order are required by him for permitted uses as a general purpose synthetic within 60 days from the date thereof.

Name of Purchaser.....

Date..... Authorized Official.....

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TRENTON 7, NEW JERSEY

Manufacturers of Thiokol Synthetic Rubber and Synthetic Rubber Chemicals

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Nerve Killers for
BUNA N

4131 xLx 4142

XLX Compounds have solved production bottlenecks in compounding Buna N stocks.

XLX Compounds are effective "nerve killers" and processing aids for Buna N stocks, particularly those of low pigment concentration.

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XLX Compounds in Buna N stocks are not oil or gasoline extractable.

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XLX 4132 increases hardness of GR-S stocks and improves tear and cut-growth resistance. Hardness of GR-S stocks may be varied without recourse to fillers.

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For further technical information, samples and prices write

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Golly, how you've grown, Mr. Jones!

Yes, the kid grew up while he was away . . . grew up dreaming dreams of a Dad who was fighting for him . . . and a million other sons. The kid grew up . . . and so did his father. He wants and deserves a better world in which to live.

United Carbon Company, Inc. during these war years has been keeping pace with the vision of those who fight democracy's battle. Its technicians and laboratories have spent every possible man-hour developing new types of *carbon black* to extend the effectiveness of industry—and the progress which industry makes possible. *Carbon black* gives strength, durability, and color to a large variety of products . . . all types of tires and automotive equipment, electrical devices, insulated wire and cables, footwear, heels, soles, plastics, paints, printing inks and many others.

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Kosmos 40

Dixie 40

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Charleston, W. Va.

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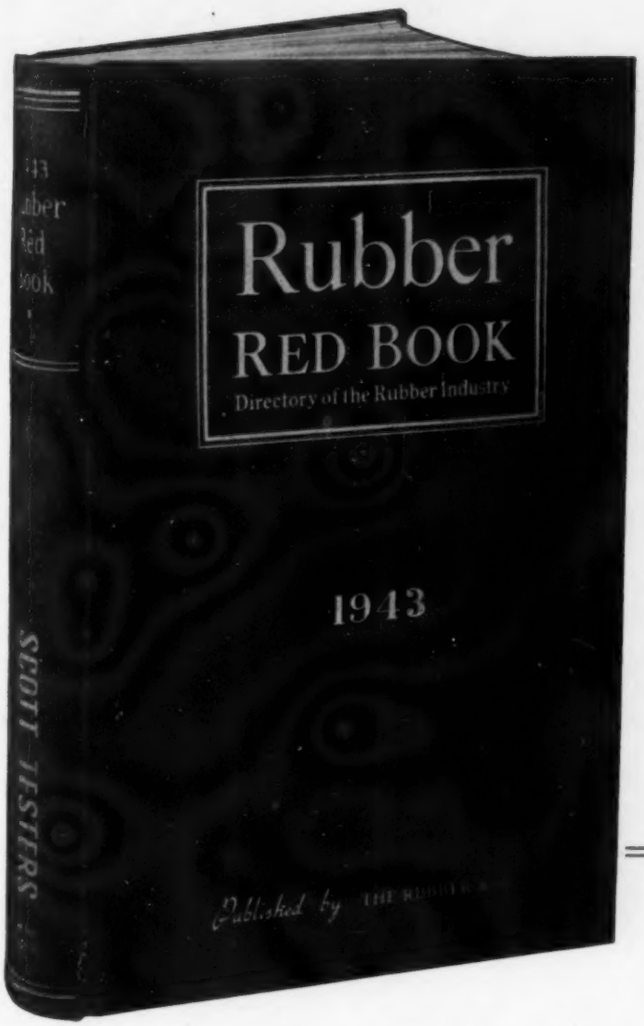
THE "ANSWER BOOK" of the Rubber Industry



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The INDISPENSABLE REFERENCE BOOK for Rubber Manufacturers, Suppliers, etc....

To rubber factory executives, purchasing agents, technologists, etc., the RUBBER RED BOOK furnishes complete and handy lists of suppliers of all kinds of materials, equipment and services classified for easy reference. This is a service which saves buyers much time and effort as in no other directory are such lists available.

Suppliers and their salesmen, on the other hand, find the RUBBER RED BOOK invaluable for its complete and accurate listing of rubber manufacturers in the United States and Canada with such data as size of company, type of products made, names of buyers and other executives, etc. Also included is a geographical breakdown of rubber manufacturers in the United States showing all companies in each city and town. This feature enables salesmen to be certain that no prospect is overlooked.

No matter what position you hold in the rubber industry — factory executive, purchasing agent, chemist, technologist; supplier of machinery, chemicals, rubber, or other materials; librarian; consultant; salesman or user of rubber products—you should have a personal copy of the 1943 RUBBER RED BOOK on your desk or in your brief case ready to give an immediate answer to the thousand and one questions which crop up constantly, particularly during these critical days when accurate information is so essential.

Summary of Contents
1943 RUBBER RED BOOK

RUBBER MANUFACTURERS IN THE UNITED STATES
Alphabetical Section; Classified List of Rubber Products; Geographical Section.

RUBBER MANUFACTURERS IN CANADA

RUBBER MACHINERY AND EQUIPMENT
Classified List of Machinery; Machinery Manufacturers and Addresses.

ACCESSORIES AND FITTINGS
Classified Lists of Products; Suppliers and Addresses.

RUBBER CHEMICALS AND COMPOUNDING MATERIALS
Classified List of Materials; Trade and Brand Names; Suppliers and Addresses.

FABRICS AND TEXTILES
Classified List of Materials; Suppliers and Addresses.

CRUDE RUBBER AND RELATED MATERIALS
Classified List; Suppliers and Addresses.

SYNTHETIC RUBBER AND OTHER RUBBER-LIKE MATERIALS

RECLAIMED RUBBER
Manufacturers and Addresses; Article, "Place of the Reclaiming Industry in the War Effort."

SCRAP RUBBER DEALERS

RUBBER DERIVATIVES

RUBBER LATEX
Latex and Latex Compounds; Water Dispersions; Special Latex Processes; Latex Compounding Materials; Latex Machinery and Equipment.

MISCELLANEOUS PRODUCTS AND SERVICES
Backing for Camelback; Cork Products; Wax Crayons; Decalcomania Transfers; Fireproofing Fabrics; Scrap Rubber Grinding; Inks for Printing on Rubber; Rubber Labels; Master Batches; Liner Compounds; Liners Processed; Mildew Treatment; Processed Liners; Separating Paper and Cloth; Saturating; Transfers, Dry.

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In the United States; In Canada.

TECHNICAL JOURNALS

TRADE AND TECHNICAL ORGANIZATIONS

WHO'S WHO IN THE RUBBER INDUSTRY

SUBJECT INDEX

USE THE ATTACHED CONVENIENT ORDER FORM

..... 19.....

THE RUBBER AGE
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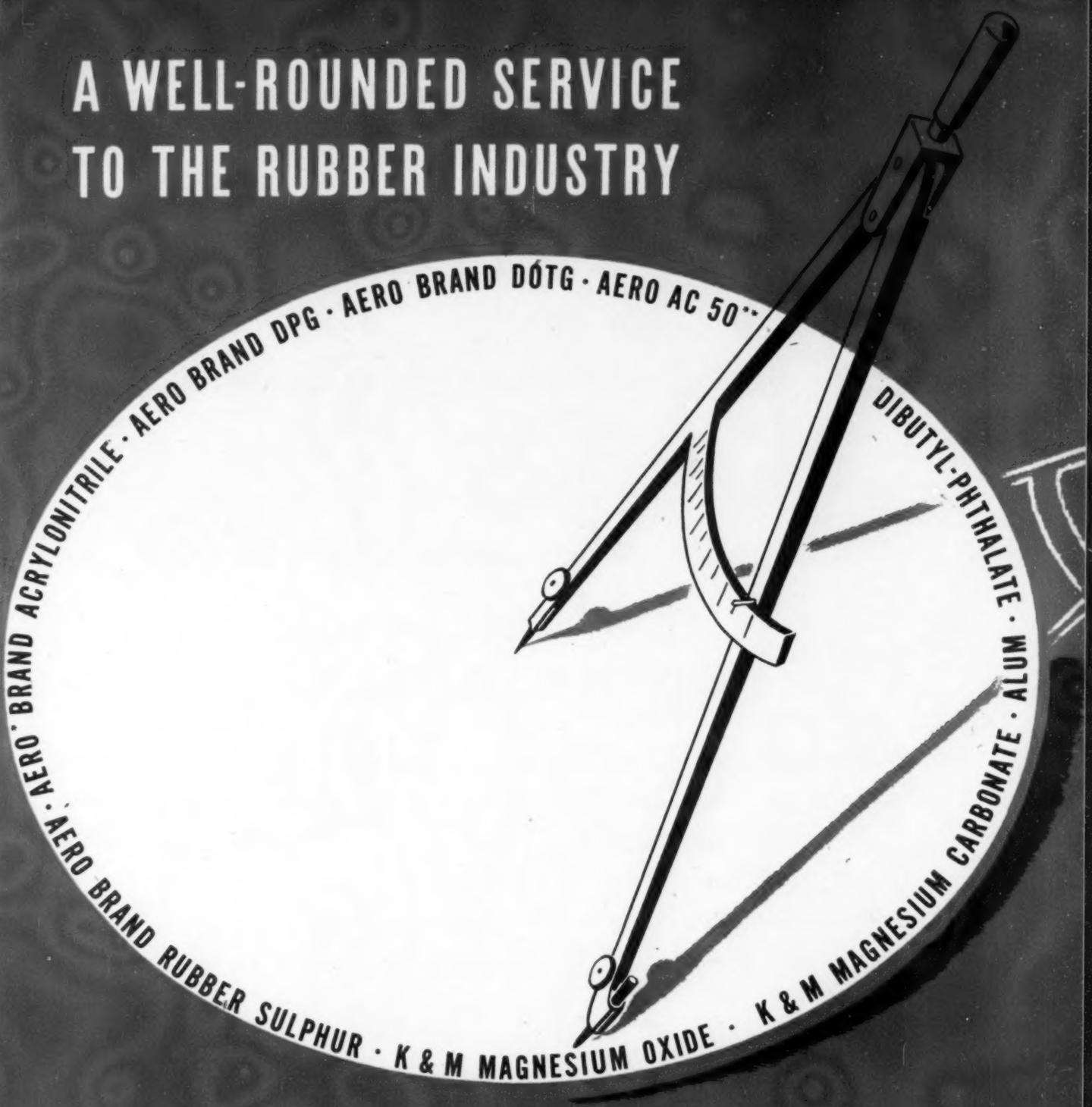
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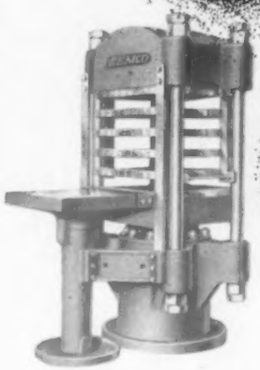

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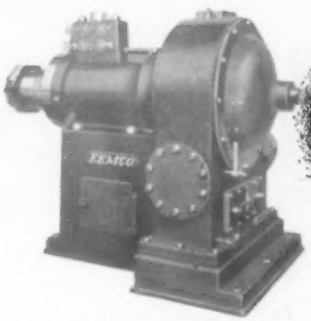

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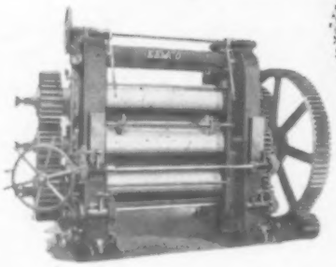

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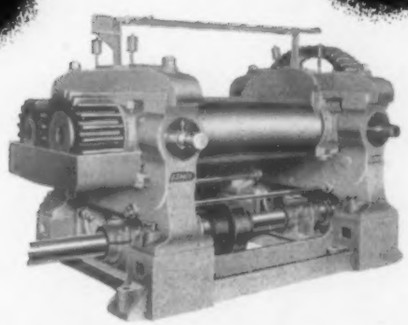

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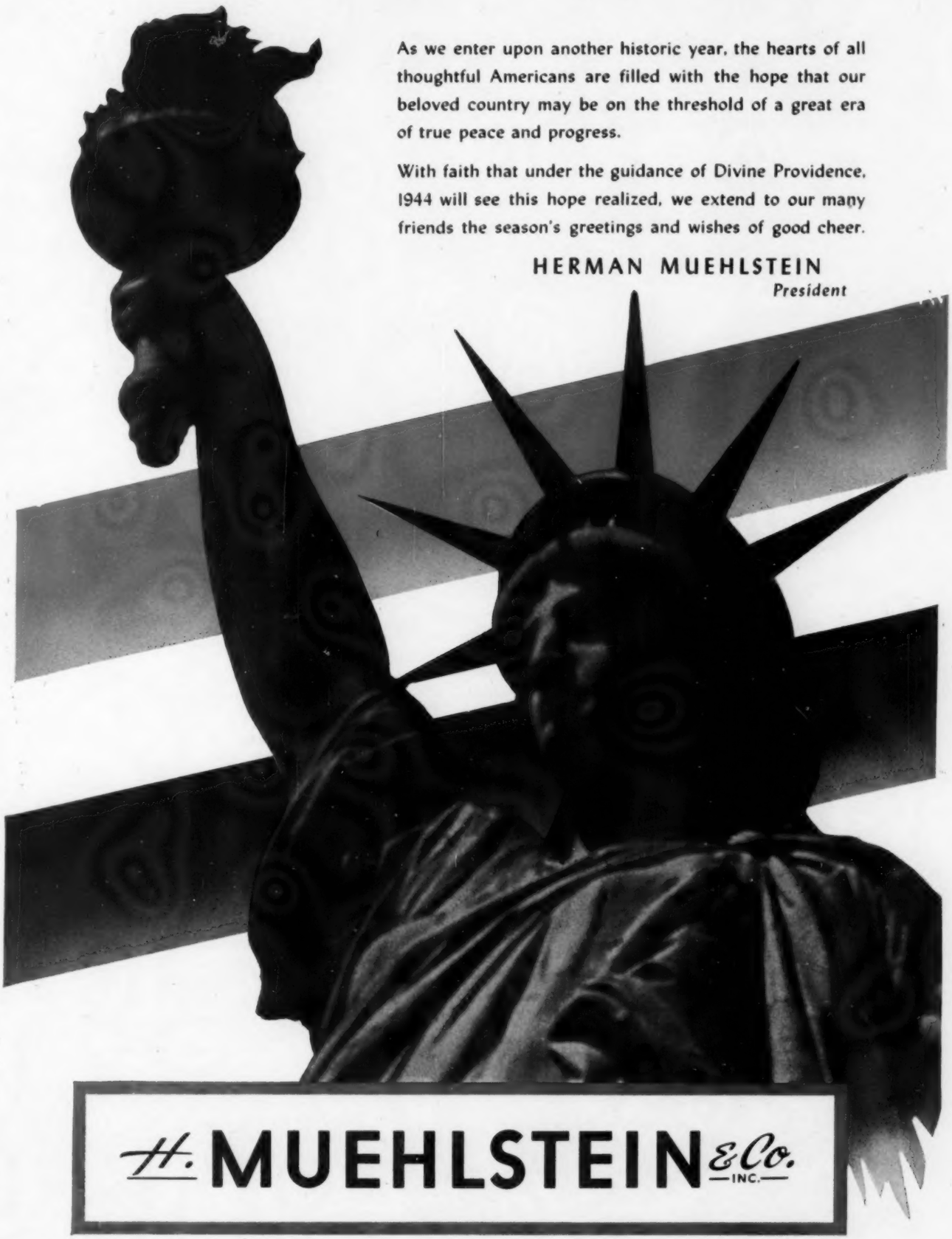
GREETINGS *for* 1944



As we enter upon another historic year, the hearts of all thoughtful Americans are filled with the hope that our beloved country may be on the threshold of a great era of true peace and progress.

With faith that under the guidance of Divine Providence, 1944 will see this hope realized, we extend to our many friends the season's greetings and wishes of good cheer.

HERMAN MUEHLSTEIN
President

H. MUEHLSTEIN & Co. INC.

"Why shouldn't I buy it? I've got the money!"

Sure you've got the money. So have lots of us. And yesterday it was all ours, to spend as we darn well pleased. But not today. Today it isn't ours alone.

"What do you mean, it isn't mine?"

It isn't yours to spend as you like. None of us can spend as we like today. Not if we want prices to stay down. There just aren't as many things to buy as there are dollars to spend. If we all start scrambling to buy everything in sight, prices can kite to hell-'n'-gone.

"You think I can really keep prices down?"

If you don't, who will? Uncle Sam can't do it alone. Every time you refuse to buy something you don't need, every time you refuse to pay more than the ceiling price, every time you shun a black market, you're helping to keep prices down.

"But I thought the government put a ceiling on prices."

You're right, a price ceiling for your protection. And it's up to you to pay no more than the ceiling price. If you do, you're party to a black market deal. And black markets not only boost prices—they cause shortages.

"Doesn't rationing take care of shortages?"

Your ration coupons will—if you use them wisely. Don't spend them unless you have to. Your ration book merely sets a limit on your purchases. Every coupon you don't use today means that much more for you—and everybody else—to share tomorrow.

"Then what do you want me to do with my money?"

Save it! Put it in the bank! Put it in life insurance! Pay off old debts and don't make new ones. Buy and hold War Bonds. Then your money can't force prices up. But it can speed the winning of the war. It can build a prosperous nation for you, your children, and our soldiers, who deserve a stable America to come home to. Keep your dollars out of circulation and they'll keep prices down. The government is helping—with taxes.

"Now wait! How do taxes help keep prices down?"

We've got to pay for this war sooner or later. It's easier and cheaper to pay as we go. And it's better to pay more taxes NOW—while we've got the extra money to do it. Every dollar put into taxes means a dollar less to boost prices. So . . .

Use it up . . . Wear it out . . .
Make it do . . . Or do without

A United States war message prepared by the War Advertising Council, approved by the Office of War Information, and contributed by the Magazine Publishers of America

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- GUANTAL
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- R-2 CRYSTALS
- THIURAD (Tetra methyl thiuram disulfide)
- METHASAN (Zinc salt of dimethyl-dithiocarbamic acid)

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That's where your leadership comes in—and the leadership of every one of your associates, from plant superintendent to foreman! It's your job to see that your fellow workers are sold the finest investment in the world. To see that they buy their share of tomorrow—of Victory!

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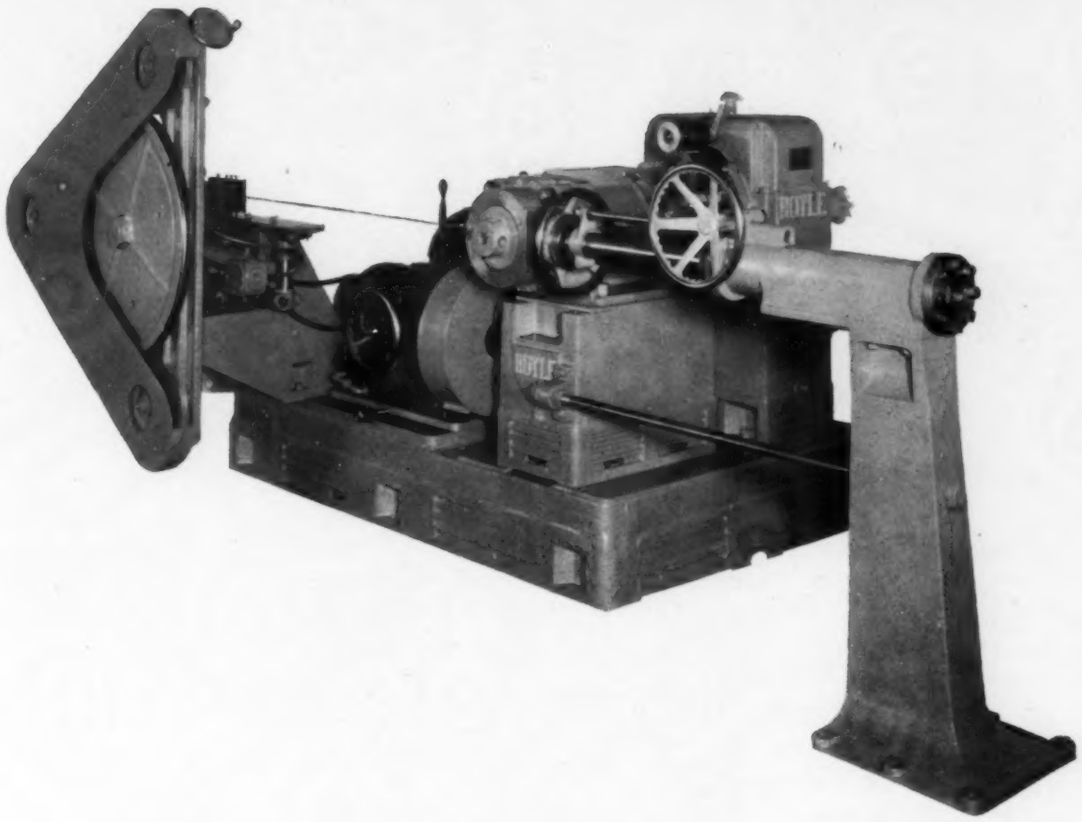
And here's one last thought. Forget you ever heard of "10%" as a measure of a reasonable investment in War Bonds under the Pay-Roll Deduction Plan. Today, thousands of families that formerly depended upon a single wage earner now enjoy the earnings of several. In such cases, 10% or 15% represents but a paltry fraction of an investment which should reach 25%, 50%, or more!

Now then—Up and At Them!

Keep Backing the Attack!—WITH WAR BONDS

This space contributed to Victory by THE RUBBER AGE

This advertisement prepared under the auspices of the United States Treasury Department and the War Advertising Council



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Thanks To American Industry . . . . .

When the history of this war is written it may well be that the most serious setback handed the Japanese resulted from the spontaneous and wholehearted spirit of co-operation exhibited by the Rubber, Chemical, and Petroleum Industries in meeting the threat to our rubber supply. Superb teamwork soon developed synthetic sources which possessed sufficient stamina to meet the more rigorous requirements of rubber products.

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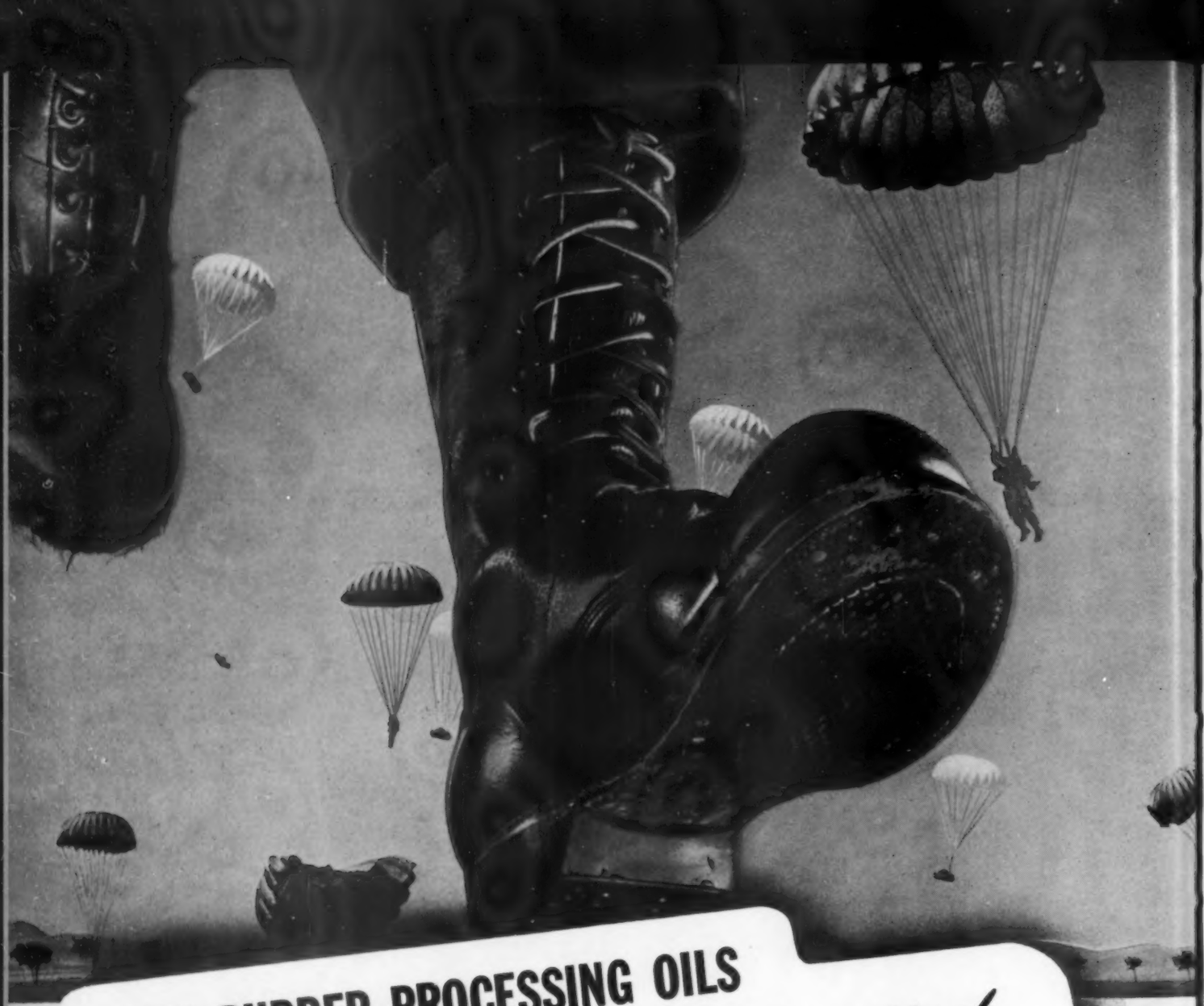

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VOLUME 54
NUMBER 4

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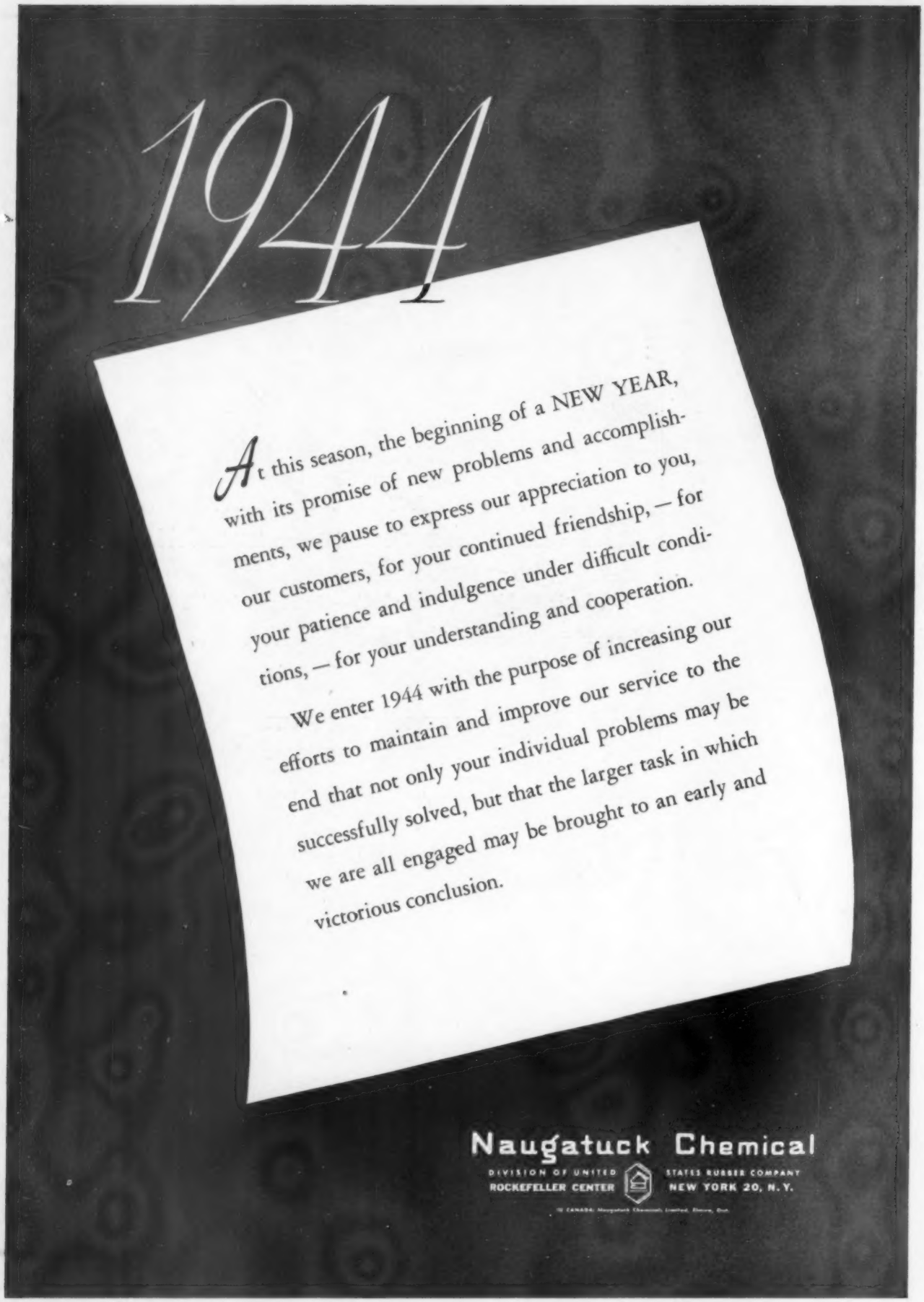

1944
At this season, the beginning of a NEW YEAR, with its promise of new problems and accomplishments, we pause to express our appreciation to you, our customers, for your continued friendship, — for your patience and indulgence under difficult conditions, — for your understanding and cooperation.
We enter 1944 with the purpose of increasing our efforts to maintain and improve our service to the end that not only your individual problems may be successfully solved, but that the larger task in which we are all engaged may be brought to an early and victorious conclusion.
Naugatuck Chemical
DIVISION OF UNITED STATES RUBBER COMPANY
ROCKEFELLER CENTER NEW YORK 20, N. Y.

The **RUBBER AGE**

VOL. 54, No. 4 **JANUARY, 1944**

An Improved Method for the Vulcanization of GR-I

By B. M. STURGIS and J. H. TREPAGNIER

Jackson Laboratory, E. I. du Pont de Nemours & Co., Wilmington, Del.

GR-I (Butyl Rubber) is unique among the commercial synthetic elastomers because of the small amount of chemical unsaturation that it contains. This limited amount of unsaturation, which is still further decreased during vulcanization, leads to the production of vulcanizates having unusual properties. The most marked of these properties is chemical stability which appears to be due to a close structural similarity between GR-I vulcanizates and saturated paraffin hydrocarbons. This resistance toward chemical attack manifests itself in many ways and makes GR-I a superior product for many uses for which an elastic material is required. Since they are not readily attacked by oxygen, GR-I vulcanizates show superior age resistance when tested under either static or dynamic conditions. Likewise, vulcanizates of this material are quite resistant to deterioration by sunlight and ozone. Strong mineral acids generally attack GR-I only very slowly in contrast to their rapid attack on natural rubber *(4)*.

The low amount of unsaturation present in GR-I leads directly to many of its advantageous properties; however, it is also a disadvantage in that it makes GR-I difficult to vulcanize. When vulcanized in the usual manner, using sulfur as the vulcanizing agent and a thiuram accelerator, GR-I cures quite slowly even at high temperatures and produces vulcanizates having a low modulus of elongation. Although in an elastomer such as rubber or GR-S only a fraction of the available double bonds is utilized in the vulcanization with sulfur *(1, 2, 3)*, nevertheless the elastomer contains many possible points of attack for the vulcanizing agent, and as a consequence the vulcanization can proceed at a rapid rate.

A large number of the known accelerators for the vulcanization of rubber have been tested as accelerators for GR-I vulcanization. Only a few of the most active, particularly members of the thiuram and dithiocarbamate classes, have been found effective, and of these tetramethyl thiuram disulfide has enjoyed the widest use. Vulcanizates produced by the use of tetramethyl thiuram disulfide and sulfur are characterized by rather low moduli, high compression set, and considerable hot flow. These characteristics limit the field of usefulness of GR-I to a considerable extent. Table I gives a comparison of the stress-strain properties of a loaded GR-I vulcanizate with those of similar GR-S and rubber vulcanizates. The following stocks were used for these tests:

	A	B	C
GR-I	100.	...	...
GR-S	...	100.	...
Smoked Sheets	...	...	100.
CF Carbon Black	50.	...	...
MPC Carbon Black	...	50.	50.
Zinc Oxide	5.	5.	5.
Stearic Acid	3.	2.	3.
Sulfur	2.	2.	3.
Tetramethyl Thiuram Disulfide	1.	...	...
2-Mercapto-Thiazoline	...	1.5	1.

These stocks were each vulcanized for periods of 30 and 60 minutes, the GR-I stock at 307° F., the GR-S stock at 287°F., and the rubber stock at 274°F. It can be seen from this table that even though the GR-I is vulcanized at a higher temperature and with the use of a more active accelerator, the state of cure reached as judged by modulus and elongation figures is below that of either of the other elastomers.

TABLE I—COMPARISON OF GR-I, GR-S, AND RUBBER VULCANIZATES

Min. Cured	Stress at 300% Elongation, psi			Tensile at Break, psi			% Elongation at Break		
	GR-I	GR-S	Rubber	GR-I	GR-S	Rubber	GR-I	GR-S	Rubber
30	400	1150	1050	2450	2850	4250	775	565	660
60	600	2075	1425	2425	3050	4375	700	380	600

GR-I differs from other common elastomers vulcanizable with sulfur in another important respect; neither the rate of cure nor the modulus obtained can be greatly influenced by increasing the amount of either the sulfur or accelerator, or by the use of a basic activator. These facts are illustrated in Table II, which gives the results of tests on stocks in which the amount of sulfur was doubled, the amount of accelerator was doubled, and a basic activator was used. These stocks were vulcanized for 30 minutes at 307°F.

	D	E	F	G
GR-I	100	100	100	100
CF Carbon Black	50	50	50	50
Zinc Oxide	5	5	5	5
Stearic Acid	3	3	3	3
Sulfur	2	4	2	2
Tetramethyl Thiuram Disulfide	1	1	2	1
Diphenylguanidine	...	...	...	1

TABLE II—VARIATION OF SULFUR AND ACCELERATOR IN GR-I STOCKS

	D	E	F	G
Stress at 300% Elongation, psi	400	425	425	225
Tensile at Break, psi	2025	1850	1850	1775
% Elongation at Break	610	580	580	700

The results of these and other similar tests indicate that ordinary sulfur-accelerator combinations have distinct limitations, and the desired improvements in GR-I vulcanizates are not likely to be obtained by their use. It is probable that a substance capable of initiating the formation of a greater number of reactive centers in the GR-I molecule, or of reacting with GR-I in a different manner, is necessary in order to obtain the desired results.

Such a substance has now been found. This substance, which is known as Polyac, is a powerful activator for sulfur cures of GR-I and enables the preparation of vulcanizates having markedly superior properties. Polyac is best used in conjunction with sulfur and an accelerator in a more or less standard type of formulation. When used in this manner Polyac gives a considerably faster rate of cure without producing scorching, and leads to the production of vulcanizates having much higher moduli, good tensiles, lower compression set, and less hot flow, as well as improvement in other physical properties. The effect of Polyac on the rate of cure and stress-strain properties of the vulcanizates is illustrated by tests on the following series of stocks in which varying amounts of Polyac were used. Results of these tests are given in Table III and in Figure 1.

	H	I	J	K	L	M
GR-I	100.	100.	100.	100.	100.	100.
CF Carbon Black	50.	50.	50.	50.	50.	50.
Zinc Oxide	5.	5.	5.	5.	5.	5.
Paraffin	1.	...	1.	1.	1.	1.
Stearic Acid	...	1.	1.	...	...	...
Sulfur	2.	2.	1.5	2.	2.	2.
Red Lead	...	...	0.5	...	...	...
Tetramethyl Thiuram Disulfide	1.	1.	1.	1.	1.	1.
Mercaptobenzothiazole	...	1.	...	...	...	...
Selenium Diethyl Dithiocarbamate	...	...	1.5	...	...	...
Polyac	...	...	...	1.	0.75	0.35

TABLE III—EFFECT OF POLYAC ON THE VULCANIZATION OF GR-I

Min. Cured at 307°F.	Stock H	Stock I	Stock J	Stock K	Stock L	Stock M
Stress at 300% Elongation, psi						
15	300	300	....	625	600	525
30	400	425	475	1075	975	800
60	600	600	700	1350	1225	975
Stress at 500% Elongation, psi						
15	700	675	....	1850	1700	1300
30	1100	1025	1150	2350	2200	1825
60	1375	1375	1525	2625	2550	2150
Tensile at Break, psi						
15	2350	2575	....	2575	2600	2600
30	2450	2700	2350	2725	2825	2550
60	2425	2475	2300	2750	2700	2525
% Elongation at Break						
15	790	820	....	670	715	720
30	770	800	720	590	660	645
60	660	700	635	510	540	600

These data show that the moduli of GR-I vulcanizates can be doubled by the use of about 0.75 parts of Polyac. The increased rate of cure is illustrated by the fact that the same state of cure is reached in 15 minutes with Stock L that requires 60 minutes with Stock H. Stocks I and J are included for comparison since the addition of mercaptobenzothiazole has been recommended for the improvement of certain properties of the vulcanizates, and selenium diethyl dithiocarbamate has been recommended as an activator. It is of considerable importance to note that tensile properties are not sacrificed in order to obtain high modulus in the stocks activated with Polyac, as is the case with certain non-sulfur vulcanizing agents. In fact, the tensile strengths are usually increased somewhat. It is also of great importance to observe that considerable increases in moduli can be obtained without seriously impairing the processing safety of the stocks. This is illustrated by the data in Table IV which was taken from scorch tests run on Stocks H to M inclusive. The figures are the results of 60 minute cures at 227°F.

TABLE IV—SCORCH TEST ON STOCKS CONTAINING POLYAC

	Stock H	Stock I	Stock J	Stock K	Stock L	Stock M
Stress at 300% Elongation, psi	No Cure	No Cure	No Cure	150	100	No Cure
Tensile at Break, psi	No Cure	No Cure	No Cure	750	625	No Cure

As further evidence of processing safety, Stock M was extruded without difficulty through both a ¼-inch and a ½-inch die, using a warm barrel and a hot head on the extruder. The resulting extruded stock possessed satisfactory uniformity and smoothness.

One interesting phenomenon that has been observed is that although the use of Polyac gives a considerable increase in modulus, the vulcanizates containing this activator have substantially the same hardness as those vulcanized with tetramethyl thiuram disulfide alone. The tear resistance of vulcanized stocks activated with Polyac is good, being in general superior to that of the

unactivated stocks. Vulcanizates cured with a mixture of Polyac and tetramethyl thiuram disulfide also show superior properties at elevated temperatures. This is illustrated in Table V in which the results of tensile and tear tests run at 70°C. on Stocks H and K are compared.

TABLE V—HOT PROPERTIES OF STOCKS CURED WITH POLYAC

Min. Cured at 307°F.	Tensile at Break at 70°C., psi		Tear Resistance at 70°C., Lbs./In.	
	Stock H	Stock K	Stock H	Stock K
30	1650	2000	185	250
60	1450	2150	185	235

Quite marked changes in the physical properties of GR-I vulcanizates can often be produced by the use of relatively small amounts of Polyac. This is illustrated by measurements of the compression set, Yerzley resilience, and heat build-up of vulcanizates prepared from the following three stocks:

	I	N	O
GR-I	100.	100.	100.
CF Carbon Black	50.	50.	50.
Zinc Oxide	5.	5.	5.
Paraffin	...	1.	1.
Stearic Acid	1.	...	...
Sulfur	2.	2.	2.
Tetramethyl Thiuram Disulfide	1.	1.	1.
Mercaptobenzothiazole	1.	...	...
Polyac	...	0.5	0.25

Each of the tests was run on test pieces cured for 65 minutes at 307°F. The compression set was measured by means of A.S.T.M. Method B, the results being given in Table VI.

TABLE VI—COMPRESSION SET TESTS

Stock	% Set
I	11.9
N	5.4
O	6.0

It can be seen that the compression set was reduced by half by the use of only 0.25 parts of Polyac.

The vulcanizates cured with the aid of this activator show greater resilience as measured on the Yerzley Oscillograph *(5)*. This is demonstrated in Table VII.

TABLE VII—YERZLEY RESILIENCE

Stock	Resilience, %
I	49.4
N	57.3
O	57.2

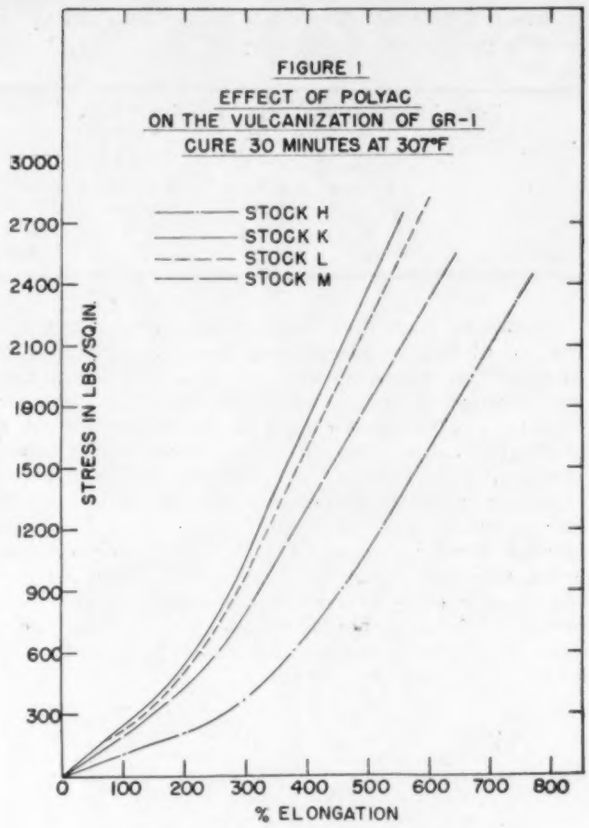
The heat build-up was measured by means of a Goodrich Flexometer, using a ⅛-inch stroke and is recorded in Table VIII.

TABLE VIII—HEAT BUILDUP IN DEGREES CENTIGRADE

Minutes Flexing	Stock I	Stock N	Stock O
5	30	26	26
10	40	36	36
20	46	40	40

Both Stocks N and O can be seen to have less heat build-up than the control.

Another important advantage obtained by the use of Polyac is the reduction in hot flow of the vulcanizates, and the reduction in permanent set after heating. These characteristics were determined by the following tests.



Dumbbell strips of the vulcanized stocks were loaded in tension to produce 75% elongation after 30 minutes drift at room temperature. The strips were then placed in a 120°C. oven under the same load for 6 hours. They were then removed from the oven and allowed to stand at room temperature under the load for 1 hour, after which the per cent hot flow was measured. The load was then released, and the permanent set was measured after the strips had stood for 24 hours at room temperature. Results are given in Table IX.

TABLE IX—HOT FLOW AND PERMANENT SET OF GR-I VULCANIZATES

Stock	% Hot Flow	% Permanent Set
I	300	95
K	165	50
N	240	70

When GR-I vulcanizates are aged for 4 days at 100°C., the moduli usually increase slightly and the tensile strengths remain about the same as they were before aging. The age resistance of vulcanizates cured with tetramethyl thiuram disulfide and Polyac, as measured by this test, does not appear to differ appreciably from that of vulcanizates cured with tetramethyl thiuram disulfide as the sole accelerator. This is indicated by the data in Table X in which results of 4 day 100° C. oven tests on two comparative stocks are presented. Stock P in this test was very similar to Stock H, while Stock Q was very similar to Stock K

in which 1 part of Polyac was used. The test pieces were cured for 60 minutes at 307°F.

TABLE X—100°C. OVEN TESTS ON GR-I VULCANIZATES

Stock	Stress at 500% Elongation, psi — Unaged	Aged	Tensile at Break, psi — Unaged	Aged
P	1375	1500	2175	2050
Q	2400	2650	2625	2650

It can be seen that GR-I vulcanizates cured with the aid of Polyac possess physical properties that are superior in many respects to those of vulcanizates cured using the standard formulation for sulfur cures of GR-I. Although the tests discussed above were all made on vulcanizates prepared from stocks having substantially the same base formula, similar improvements in physical properties can be obtained by the use of Polyac in stocks of different composition. Even greater increases in modulus are often observed when other types of carbon black are used. Table XI gives the results of tests on the following two stocks in which an SRF carbon black was used. This type of black normally gives lower tensiles at break with GR-I than the CF carbon blacks.

	R	S
GR-I	100	100
SRF Carbon Black	50	50
Zinc Oxide	5	5
Stearic Acid	1	...
Paraffin	...	1
Sulfur	2	2
Tetramethyl Thiuram Disulfide	1	1
Mercaptobenzothiazole	1	...
Polyac	...	1

TABLE XI—STRESS-STRAIN PROPERTIES OF GR-I VULCANIZATES CONTAINING SRF CARBON BLACK

Mins. Cured at 307°F.	Stress at 300% Elongation, psi — R	S	Tensile at Break, psi — R	S	% Elongation at Break — R	S	Tear Resistance, Lbs./In. — R	S
15	275	1175	1700	1625	810	400	175	175
30	450	1300	1700	1750	730	395	130	150
60	600	1400	1425	1750	630	370	100	140

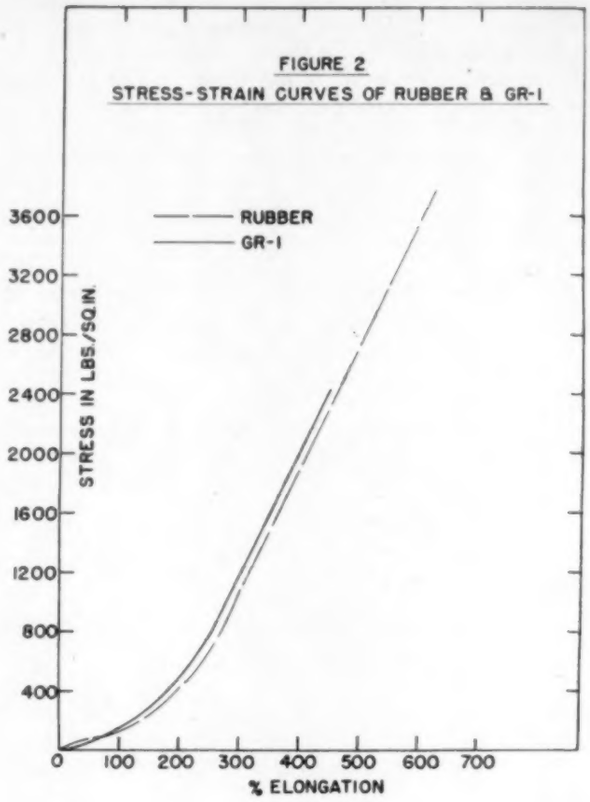
Stock S was found to retain its tensile strength and tear resistance to a much greater extent after 4 days at 100°C. than did Stock R. The 65 minute cure at 307°F. of Stock S also gave a 6°C. lower heat build-up after 20 minutes flexing with ⅛-inch stroke on the Goodrich Flexometer than a similar cure of Stock R.

Polyac has been tested in combination with a number of other accelerators, and has been found to activate many of them. Results of tests on several different classes of accelerators are given in Table XII. The stocks used were similar to Stocks H and K and the cures were for 60 minutes at 307° F.

TABLE XII—TESTS ON POLYAC IN COMBINATION WITH SEVERAL ACCELERATORS

Accelerator	Stress at 300% Elongation, psi — No Polyac	1 Part Polyac	Tensile at Break, psi — No Polyac	1 Part Polyac
Tetramethyl Thiuram Disulfide	600	1275	2150	2500
Tetramethyl Thiuram Monosulfide	750	1200	2050	2625
Dipentamethylene Thiuram Tetrasulfide	450	1250	2025	2225
Selenium Diethyl Dithiocarbamate	750	1325	1775	2275
Lead Dibutyl Dithiocarbamate	600	850	1850	2300

FIGURE 2
STRESS-STRAIN CURVES OF RUBBER & GR-I



Polyac has been found to activate many different types of accelerators, but it is especially valuable when used in combination with thiuram and dithiocarbamate accelerators. The use of Polyac activation enables one to obtain good cures from GR-I stocks at considerably lower curing temperatures than those commonly used. Using a combination of 0.5 parts Polyac and 1 part tetramethyl thiuram disulfide in a stock similar to Stock N, a satisfactory cure was obtained in 60 minutes at 287°F. By proper balancing of the proportions of Polyac and thiuram it appears possible to cure satisfactorily at even lower temperatures.

A number of other variations in the base formula K have been investigated. Although other metal oxides can be used, zinc oxide gives the best results of any that we have tried. Stearic acid can be included in the stocks if desired, but in general Polyac produces greater activation in the absence of any organic acid. Neither the sulfur nor the accelerator ratios are at all critical and good cures have been obtained with Polyac and tetramethyl thiuram disulfide by the use of as little as 0.5 parts of sulfur. The effectiveness of Polyac is not limited to the type of butyl rubber known as GR-I, since substantially similar results were obtained using Butyl A, and Butyl B 1.45.

Polyac, especially when used in concentration below 0.5 parts, can be added to the batch at any time during the mixing cycle. It is generally found preferable, however, to add it to the batch last. The preparation of masterbatches of Polyac is not recommended, as this practice leads to lower tensiles.

The application of Polyac to the vulcanization of GR-I is of considerable interest from the theoretical

(*Continued on page 363*)

Cryptostegia Rubber —Its Rebirth and Development

By THOMAS A. FENNELL

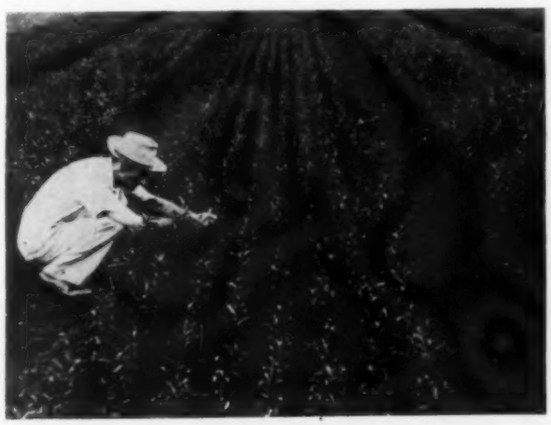
President and General Manager,
Haitian-American Agricultural Development Corp.

In somewhat the same sense that butyl rubber is the question mark of the synthetic rubbers, so too is cryptostegia the question mark of the crude rubber field. Long known to science, cryptostegia rubber had its rebirth as the result of the global conflict. Haiti was selected as the country for its largest cultivation. What progress has been made with it? What advantages does it possess? Is it strictly a war-time "necessity" rubber or does it have a post-war future? These are among the many questions answered in this article, written by the man most closely allied to its large-scale, emergency development in Haiti.—Editor.

THE Battle of Rubber in the Western Hemisphere is an uphill fight against imposing obstacles. In the production of natural rubber, it is a battle to move men and supplies into trackless jungles to tap wild trees. It is a battle to lay the foundations for a long-range plantation industry. Above all, for immediate war needs, it is a battle against time—a race to produce sufficient natural rubber to meet war requirements while our major former rubber supply sources in the Far East are closed.

Yet nature cannot be hurried by the urgencies of wartime. It takes on the average seven to eight years to get rubber production from the Hevea tree, the most prolific producer among hundreds of latex-yielding plants. At the fall of Singapore in January, 1942, the huge rubber plantation industries of Malaya and the Netherlands East Indies represented many years of development work and large expenditures of capital. Hundreds of thousands of workers were engaged in tapping, handling and distributing rubber from the Far Eastern plantations. These plantations and distributing organizations could not be duplicated quickly elsewhere.

Young plant about ten days after having been transplanted from the nursery.



Six-week old cryptostegia seedlings in one of Shada's nurseries.

Fortunately, at the fall of Singapore, the United States had a substantial stockpile of natural rubber to help bridge the gap until synthetic factories and the inter-American natural rubber program could produce in a measure sufficient to offset the supply losses in the Far East. The inter-American program of cooperation in development of the natural rubber industry in the tropical Americas was beginning to make more rapid progress when the supply crisis arose after Pearl Harbor. In Haiti, the Societe Haitiano-Americaine de Developpement Agricole (Haitian-American Agricultural Development Corporation), better known as SHADA from the initials of its French name, had

With these simple machines tappers can collect the latex from 1½ acres daily.

begun work on the establishment of a rubber plantation industry, based mainly on the Hevea tree.

SHADA is a Haitian organization, supported by credits from the Export-Import Bank of Washington and technical aid from the United States. Haiti, with climate and soil favorable for tropical agriculture, with a large reservoir of manpower in proportion to its territorial size, was judged well suited for a rubber industry. SHADA was a going concern ready to take a larger hand in the rubber program when the loss of the Far Eastern supply sources made it imperative to use every possible means to increase rubber production in the Western Hemisphere—and to increase it quickly regardless of cost.

Assumes Front Line Position

So SHADA, at the outset in its career, assumed a front line position in the Western Hemisphere's Battle of Rubber. And SHADA undertook to grow rubber fast. SHADA's vehicle for the race with time is cryptostegia, a quick-growing vine, which produces a high grade of natural rubber, comparing favorably in quality with latex obtained from the Hevea tree.

In October, 1942, SHADA contracted with United States procurement agencies for the planting of up to 100,000 acres of cryptostegia to help meet emergency needs for natural rubber. Now, after a year, the cryptostegia project is beginning to produce rubber. Production starts as a trickle, but we expect it to increase to about 3,000 long tons in 1944, and 10,000 to 12,000 tons in 1945. The project in Haiti, so far as we know, is the first large-scale effort to produce rubber from the cryptostegia vine. Aside from the immediate need for natural rubber, it should make a useful demonstration of the productive possibilities of cryptostegia in comparison with production from Hevea and Castilloa trees and from newly-built synthetic rubber factories.

More than 30,000 acres already have been planted to cryptostegia in Haiti. By the end of 1943, we expect to have between 60,000 and 85,000 acres cleared and planted and to bring 10,000 acres into production by the start of 1944. Before the end of 1944, the entire planted area should be in production. For cryptostegia's main advantage in the battle for rubber is quick production. The cryptostegia vine can be tapped within a year after planting. And since time is the big element in the wartime Battle of Rubber, cryptostegia was chosen as one of the best bets in the race to increase natural rubber production in the Americas as quickly as possible. SHADA has about 65,000 Haitians working on the cryptostegia project. After planting, these workers continue as tappers when the vines come into production.

When SHADA undertook the cryptostegia program, 1,000 acres of wild plants in Haiti were available as a source of propagating material. We knew it was possible to tap the vine, that it would yield rubber of a high quality. But field procedures we had to learn and devise as the project evolved. We also had to devise a method of tapping the vines. These problems, we believe, have been solved satisfactorily in view of the limited time available for research and experiment. We figure now that SHADA can produce rubber from cryptostegia at an over-all cost of about 60 cents per pound. And we hope to learn more and more to improve further both producing and tapping methods.

First note the characteristics of cryptostegia. The plant is a native of Madagascar. It is a strong and beautiful vine, with much the same habits as a climbing rose. The cryptostegia plant, however, has no thorns. It is covered with glossy green leaves and a profusion of lavender fragrant flowers, shaped something like small Easter lilies. The plant long has been cultivated throughout the warm parts of the world as an ornamental vine. Its ability to produce high quality rubber has been recognized for at least fifty years but SHADA's project in Haiti is the first attempt to use it on a commercial scale. The life of the cryptostegia plant is indefinite, with an expectancy of at least 25 years on plantations. The tapping is not injurious to the plant. On the contrary, SHADA's plants seem to gain under the tapping operation, to produce more rubber and to become larger during the first year or so.

Start of Field Development

Actual field development in the cryptostegia program in Haiti started January 1, 1943. The first two or three months were spent chiefly in organizing and obtaining land. Initial field plantings were made in February, when 2,000 acres of seed were planted. During the final months of 1942, SHADA had planted about 100 acres in nurseries and 60 acres for experimental purposes.

In May, 1943, approximately 20,000 acres of seed had been planted. By then it was apparent that direct field seeding was not sufficiently successful or cheap to be considered the best method. Instead the planting of nursery-grown stumps of small plants proved cheaper and more satisfactory. So SHADA stopped direct field seeding for large-scale nursery development. From mid-May to mid-August, more than 1,800 acres in irrigated nurseries were planted, yielding in excess of 500,000,000 sturdy young plants. These stumps are planted at the rate of between 400 and 500 acres a day, involving the setting out daily of from 2,800,000 to 3,500,000 plants.

At the start, each of the young plants was placed in a carefully dug hole and the soil was replaced by

hand. This was slow and laborious. It cost about $10 an acre to plant 10,000 plants by this method. The cost of the operation, however, was reduced by use of a steel dibble. With the dibble, SHADA's planting crew now set out 7,000 plants at an average cost of about $3 an acre.

Special Tapping Machine Developed

The second great problem was how to gather the rubber—whether it was best to obtain it as latex or as coagulated pieces of rubber. In the early stage of the cryptostegia project, much skepticism existed as to whether it was practicable to collect latex from billions of plant stems without incurring exorbitant tapping costs. SHADA's work on this problem started with the understanding that the stems would have to be grouped into bunches. Then technicians set about finding the best way of obtaining latex from the bunched stems. A simple machine was developed which now enables the Haitian worker to tap on the average from one and a half to two acres a day. This is another factor in keeping down over-all production costs.

The tapping is done this way: the tappable whips, or long climbing branches, are gathered into bunches of from eight to twenty each. The bunches are tied about four feet above the ground and then tied again toward the end of the stems. The bunches remain tied until tapping cuts back past the tie. The worker places the bunched stems in a clamp at the top of the tapping stick and, using a sharp knife, cuts the stems about one inch above the ends. The cut ends are saved, for each end has a small plug of rubber, similar in shape to the rubber at the end of a pencil.

After the stems are cut, the latex drips for about three minutes through a small funnel in the tapping stick into a container. A tapper handles about ten tapping sticks and taps from 800 to 1,600 bunches daily. Each plant is tapped every alternate day throughout the year, save for periods of extreme drought. SHADA tappers are producing approximately 300 pounds an acre a year from young plants. This compares with production of about 300 to 400 pounds from Hevea seedlings under average circumstances and about 500 pounds an acre annually from Hevea after six to ten years of growth.

When the containers on the tapping stick are nearly full, the tapper transfers the latex into a milk pail and carries it to the farm factory. There the latex is put in large tanks, then drawn off into small coagulating tanks, where it is mixed with approximately six times its volume of clear water. The latex immediately coagulates. The soft coagulum is pressed into sheets, rolled and then put through a marking roller which gives the sheets a waffle-like appearance. The sheets are soaked in water to remove impurities, dried and smoked over fire for about seven days. Tests of the smoked sheets show SHADA's rubber to be equal to the best Hevea for all practical purposes.

M. D. Knapp, Chief, Plantations Section, Rubber Development Corp., holding a bundle of tappable cryptostegia whips. Note method of tying.

Young cryptostegia grafts shown about eight days after grafting.

Water Coagulating Method Preferred

Cryptostegia latex, like the latex of other rubber-producing plants, contains only a relatively small amount of rubber in comparison with moisture and other non-rubber substances. The water coagulation method washes away the non-rubber material. SHADA's research has revealed some fifteen or twenty other methods of coagulating cryptostegia latex. None has been found to be as satisfactory as the water coagulating method. Recently SHADA discovered how to condense and to preserve the latex indefinitely in a liquid form; also how to coagulate the condensed latex and make it at will into good rubber. Cryptostegia latex is acid in its reaction. So cryptostegia latex may prove useful for processes not available to Hevea latex, which is basic in its reaction. Experiments in this connection are scheduled for the near future.

These improvements in cryptostegia operations illustrate the possibilities for reducing costs through practical experience. How much can be done toward the goal of lower production costs remains to be seen. One important point about cryptostegia must be considered in gauging its long-run chances of staying in the production battle: The cryptostegia plant is comparatively free of disease. No serious pathological diseases have been found for cryptostegia and none are anticipated at the present time.

Moreover, cryptostegia is about in the same development position as Hevea was in 1900. Then cultivated Hevea plants mostly were seedlings. No high-produc-

ing Hevea varieties had been developed through research and experiment. In Haiti, SHADA is carrying on, simultaneously with planting operations, extensive research with the objective of producing better-yielding strains. Already SHADA's research efforts have uncovered plants which are three times as productive as the average. More than 100 individuals have been found which produce at least three times the average. Unfortunately, this tendency toward high production is not always carried through to the grafted progeny of the high-yielding plant. So far as we know, SHADA's research is the most concentrated effort yet made to improve cryptostegia's productive capacity.

Special Advantages of Cryptostegia

As we learn more about cryptostegia, and improve the efficiency of field operations, the long-term production prospects naturally become brighter. One advantage of cryptostegia is the short development period. This means invested capital is tied up only a year or so before production starts, in contrast with seven to eight years in Hevea rubber. Still, unless cheaper tapping methods and higher-producing strains can be developed, cryptostegia undoubtedly will have difficulty competing with Hevea on a straight price basis in the event of a return to former competitive conditions in the world rubber markets. There is, in addition, the new competitive factor of synthetic rubber. Yet, all things considered, cryptostegia rubber may become commercially valuable. It has qualities which may prove useful for special purposes and thus command a premium in the rubber markets.

Meanwhile, the SHADA project is the first large-scale test of the commercial possibilities of cryptostegia, aside from its immediate purpose of adding quickly to the Western Hemisphere's sources of natural rubber; nor is Haiti's role as a rubber-growing laboratory restricted only to cryptostegia. The development of a long-range plantation program based on the Hevea tree proceeds along with the cryptostegia operations. Substantial acreage is being planted to Hevea seedlings, to provide stock for rubber plantations which should come into production over the next decade. This carries out plans conceived before Pearl Harbor in recognition of Haiti's favorable conditions for tropical agriculture and need of additional cash crops which find a vast and ready market in the nearby United States.

Haiti Welcomes Increased Income

Both rubber and sisal—Haiti's major contributions to the United Nations in way of strategic materials—hold prospects of increasing the income of the Haitian people. Agriculture is the primary occupation of Haiti's 3,000,000 population, living within an area of only 10,700 square miles. The Haitian rural dweller lives largely by subsistance farming. He could advantageously use sources of cash income, such as tapping a stand of rubber trees, while retaining his self-sufficient status as a food producer. Neither cryptostegia nor Hevea rubber planting will crowd Haitians off the land. All the operations of SHADA —large as they are—occupy less than 2 per cent of the total area of Haiti. Most of the land brought under cultivation by SHADA formerly was in a wild or semi-wild state. Less than one half of one per cent of Haitian land has been taken out of its usual usage by SHADA.

Everlite Resin Cements

SPECIAL modified resins which contain no rubber have been developed by the Central Process Co., Forest Park, Ill., for bonding rubber or synthetic rubber to metal, wood or plastics. Bonds of good strength, resistant to heat and solvents, can be achieved, according to the manufacturer, if the resins are properly handled. The bonding materials are sold under the name of "Everlite."

The company offers a wide selection of these special modified resins. For bonding rubber to metal, wood or plastics it recommends its Everlite CPC No. 4162-2. When used, this resin should be diluted with nitropropane or ethyl acetate to obtain a thin brushing consistency. Nitropropane, since it imparts thin brushing qualities, is considered preferable. The adhesive should be air dried for a few minutes and the parts then assembled for pressing. A heated punch-and-die is necessary for bonding irregular shapes, whereas a flat plate hydraulic press may be used on flat surfaces. The resin is quite stable but should be kept covered and in a cool place to avoid undue thickening.

In the case of bonding rubber to metal, the curing time usually ranges between 50 seconds and several minutes at 300° to 320°F., depending upon the thickness of the metal and the amount of rubber in the stock.

The company's Everlite No. 4258 also has been used quite successfully in bonding rubber to wood, but it is not recommended for bonding metals, glass or rubber unless primed with Everlite CPC No. 4176.

Everlite may be handled in a number of different ways, the procedure employed depending upon the facilities at hand and the particular nature of each application. In general, the resin may be applied by brushing, mechanical spreading or doctor coating but, in order to develop maximum strength, it is desirable to allow the coated surfaces to air dry for approximately two hours at room temperature, the resin being ready for clamping when the film is stiff, tacky, and barely flows when pressure is applied. Weaker bonds may result if the film is too hard or too thin at the time of clamping.

Everlite is set by a chemical action of the catalyst upon the resin molecules. After setting has taken place, the catalyst eventually becomes inert. This condition is important in order to reduce the progressive action of the catalyst, which would otherwise seriously impair the aging of the bond and cause an eventual loss in strength.

Amerigum Softener-Extenders for the Compounding of GR-S

By CHARLES J. HAUCK

American Alkyd Industries, Inc., Carlstadt, New Jersey

DURING the past few years a good deal of attention has of necessity been given to synthetic rubber compounding ingredients, particularly to efficient softeners and plasticizers which would shorten the time of compounding. As is very well known, the compounding and milling of practically all of the synthetic rubbers takes approximately one-third more time than does the natural rubbers. A number of plasticizers are already on the market, some of which unfortunately combine some disadvantages with the specific advantages they offer.

Among these disadvantages are the retarding of curing time, decrease in tensile strength and loss in abrasion resistance of the finished product, these disadvantages being particularly apparent when the compounding materials are used in quantities necessary for proper plasticizing on the mill. Considerable attention has also been paid to the development of materials which would reduce the tendency for cut growth and permanent set exhibited by the synthetic rubbers.

In an attempt to meet the special requirements of the industry, we instituted a research program for new types of synthetic rubber compounding ingredients some time ago and as a result we have developed a number of softeners and extenders which have been introduced under the name of Amerigum.* The Amerigums represent a series of synthetic condensation products made of domestic organic materials, all of which are available in large quantities.

Amerigums currently available may be classified into three distinct types as follows: Type I (Amerigum A and B); Type II (Amerigum C and D); Type III (Amerigum E and F). Each of these specific types have different physical properties and the results obtained from each type differ materially. The properties exhibited by each type are best shown by their behavior in typical GR-S formulations. The materials referred to above were tested by the V. L. Smithers Laboratories, of Akron, in two different loadings, in one case using 10% of the softener-extender and in the other 20%, both loadings on 100 parts of GR-S. The following base compounds were used:

BASIC COMPOUNDS

	10% Loading	*20% Loading*
GR-S	100.	100.
W-6 Black	50.	50.
Zinc Oxide	5.	5.
Sulfur	2.	2.
Santocure	1.5	1.5
Softener-Extender	10.	20.

As controls, two commercially available plasticizers

* Patent application pending.

TABLE I

Material	*Cure in Min. @ 280° F.*	*Stress in Lbs./Sq. In. 300%*	*Tear* *	*Shore Hardness*	*Tensile @ Break Lbs./Sq. In.*	*Elong. @ Break %*	*Set @ Break %*	*Plasticity Mooney*
			10% Loading					
Amerigum A	60	870	295	65	2310	560	31	91
Amerigum B	30	920	330	67	2430	590	34	99
Amerigum C	45	780	340	63	2430	625	32	91
Amerigum D	60	1470	220	70	2330	420	22	92
Amerigum E	60	800	310	65	2710	660	41	84
Amerigum F	90	750	320	56	2680	700	34	74
Turgum	75	920	175	63	2870	610	25	92
Naftolen R-100	60	1040	250	55	2340	560	22	71
			20% Loading					
Amerigum A	75	600	290	66	2010	650	42	77
Amerigum B	30	870	280	70	2070	580	41	78
Amerigum C-1	75	600	295	53	2370	663	39	71
Amerigum D	30	880	300	69	1920	520	35	77
Amerigum E	90	630	295	68	2550	716	63	68
Amerigum F	90	370	250	48	2130	833	50	54
Turgum	90	510	150	60	2390	756	34	71
Naftolen R-100	45	650	250	47	2450	786	30	49

* All tear tests made "crosswise" at room temperature.

TABLE II—10% LOADING

Cure in Mins. @ 280° F.	Stress in Lbs./Sq. In., 300%	Tear	Shore Hardness	Heat Loss, %	Tensile @ Break, Lbs./Sq. In.	Elongation @ Break, %	Set @ Break, %
Turgum Compound (Sp. Gravity, 1.152; Plasticity, 91.0-93.5)							
30	380	160	54	0.74	1650	780	38
45	640	220	59	0.99	2480	690	32
60	830	195	62	1.05	2380	590	25
75	920	175	63	0.96	2870	610	25
90	960	195	63	0.92	2790	586	24
Naftolen R-100 Compound (Sp. Gravity, 1.143; Plasticity 71.-71.)							
30	480	295	48	...	2380	750	34
45	800	300	54	...	2270	600	25
60	1040	250	55	...	2340	560	22
75	1160	230	55	...	2270	485	16
90	1050	235	55	...	2240	480	16
Amerigum C Compound (Sp. Gravity, 1.147; Plasticity, 90.5)							
30	430	135	58	0.71	1630	730	44
45	780	340	63	0.69	2430	625	32
60	950	300	65	0.68	2020	486	25
75	1030	245	66	0.63	2160	483	20
90	1190	255	67	0.56	1840	405	14
Amerigum E Compound (Sp. Gravity, 1.153; Plasticity, 83.5-86.0)							
30	270	225	53	...	970	850	82
45	650	360	62	...	2470	750	45
60	800	310	65	...	2710	660	41
75	940	315	68	...	2160	536	34
90	1010	265	68	...	2360	526	31
Amerigum F Compound (Sp. Gravity, 1.146; Plasticity, 73.5-74.0)							
30	90	75	28	...	310	935	134
45	350	220	48	...	1580	846	45
60	480	350	53	...	2460	800	38
75	640	355	55	...	2580	725	36
90	750	320	56	...	2680	700	34

were used, namely, Turgum and Naftolen R-100. Tables I to III show results of normal tests before aging while Table IV shows tests after 24 hours of aging at 100° C. Table I shows in condensed form the values for the particular cure of the various softener-extenders which yielded the highest tensile strength in a series of cures, carried out at 30, 45, 60, 75 and 90 minutes, respectively, all at 280° F. This table shows both the 10 and 20% loadings. Products tested include Amerigum Types A, B, C, D, E and F, in addition to the two controls—Turgum and Naftolen R-100.

To demonstrate the individual behaviors of some of the softener-extenders under consideration, a series of tests were run, the results of which are indicated in Table II, all compounds having a 10% loading and all cures made at 280° F. The materials covered in these tests included Turgum, Naftolen R-100 and Amerigum Types C, E and F. The specific gravity and plasticity of each compound tested is included for convenience.

Individual behaviors with 20% loadings are indicated in Table III, with results shown for loadings of

TABLE III—20% LOADING

Cure in Mins. @ 280° F.	Stress in Lbs./Sq. In., 300%	Tear	Shore Hardness	Heat Loss, %	Tensile @ Break, Lbs./Sq. In.	Elongation @ Break, %	Set @ Break, %
Turgum Compound (Sp. Gravity, 1.147; Plasticity, 70.0-71.5)							
30	200	125	50	1.71	780	895	76
45	320	155	54	1.56	1720	876	44
60	420	185	57	1.50	2040	820	41
75	460	165	59	1.49	2220	773	34
90	510	150	60	1.47	2390	756	34
Amerigum E Compound (Sp. Gravity, 1.150; Plasticity, 67.0-68.5)							
30	250	220	54	...	1260	1000	115
45	390	330	63	...	2000	866	76
60	510	325	67	...	2420	786	69
75	520	295	68	...	2540	735	70
90	630	295	68	...	2550	716	63

Turgum and Amerigum E only. Here again the specific gravity and plasticity of the compounds used are shown.

The two best cures for compounds containing Naftolen R-100 and Amerigum Types E and F (20% loading) after aging for 24 hours at 100° C. are shown in Table IV. These results are included for purposes of comparison.

Conclusions

Based on the series of tests reported and shown herewith, the following conclusions can be drawn:

Amerigum Types A and B are interesting where higher modulus is desired and they show high tear resistance.

Amerigum Types C and D result in harder stocks than secured with some of the other plasticizers but they indicate good tear resistance. Amerigum D in the 10% loading yields very high modulus at 300% (1470) together with high tensile strength and fair tear resistance. Such properties are valuable in the manufacture of soles and heels.

TABLE IV—AFTER AGING (24 HRS. @ 100° C.)

Material	Min. Cure @ 280° F.	Stress in Lbs./Sq. In., 300%	Tear	Shore Hardness	Tensile @ Break, Lbs./Sq. In.	Elong. @ Break, %	Set @ Break, %
Naftolen R-100	45	1410	140	61	1830	365	11
	60	1410	215	61	1890	383	9
Amerigum E	30	1120	220	78	1980	475	41
	60	1320	220	81	2020	460	41
Amerigum F	75	760	300	63	2440	655	38
	90	710	275	65	2380	650	38

Amerigum Types E and F both yield high tensile strength with a medium modulus at 10% loading in addition to high elongation and high tear. These types should find general application. It is interesting to note that on the mill Amerigum F gave a strong plasticizing effect but maintained high tensile strength and good properties after vulcanization.

In the 20% loadings, Amerigum C-1 (which is very similar to Amerigum C) and Amerigum E gave high tensile strength with attractive elongation, high tear and a medium high modulus. Amerigum F gave extremely high values in tensile with medium high modulus and high elongation while Amerigum E indicated high tensile with somewhat higher modulus and medium elongation.

Thermodynamic Process for Reclaiming Rubber

THE principle underlying all reclaiming processes, according to an article in a recent issue of the *India-Rubber Journal*, is "reversion"—reversion of vulcanized rubber from the relatively rigid elastic state to a plastic condition resembling that of uncured stock. Reversion is frequently experienced on over-cure of soft rubber mixes containing little sulfur and a fast accelerator. Any soft vulcanized rubber will revert if heated for a sufficient period at a high temperature, provided free sulfur is absent or chemically removed.

In the alkali process of reclaiming, reversion is stimulated by removal of free sulfur by reaction with caustic soda. The process, backed by decades of research and experience, can give unsurpassed reclaim; but it involves heavy outlay in equipment difficult to acquire in times of emergency. The process is long and costly. When a sudden demand arose for greatly increased production of reclaim, it was natural that attention should be focused on simpler thermal processes, which promised success in dealing with modern low-sulfur compounds which might be expected to revert without sulfur-extraction.

The mechanism of reversion has long been discussed. Mr. F. H. Cotton, M.Sc., A.I.C., F.I.R.I., of the Northern Polytechnic Rubber Department, who, in conjunction with Mr. P. A. Gibbons, M.Sc., has developed "thermodynamic reclaiming", says that the rubber crisis stimulated him to test certain theories he held regarding the softening of vulcanized rubber. Investigation confirmed his views.

Having found how to induce reversion and accelerate it at will, the problem was to attain rapidly and uniformly the temperature at which optimum plasticity was observed to develop. Air was discarded as a heating medium because of its low heat capacity and poor thermal conductivity. In Bemelmann's and other thermal reclaiming methods severe local oxidation is apt to occur during the long heating period required to raise the rubber to temperature in air or other gas. High pressure steam, though efficient, was unacceptable owing to the difficulty of acquiring suitable autoclaves under present conditions. Superheated steam, Mr. Cotton explains, is a gas of low heat conductivity and relatively poor heating ability however hot it may be.

A bold bid was made to employ internal friction to raise rubber waste quickly to the temperature desired. This proved effective beyond all expectation and immediately disclosed a specific softening action additional to that of heat or other influences alone. Mechanical working at high temperature seems literally to disrupt the three-dimensional structure developed when rubber is vulcanized.

The perfected process was brought to the notice of the Rubber Control (England) during the summer of 1942, and subjected to careful test. The Ministry of Supply was impressed by the extreme rapidity of the thermodynamic process, and gave permission for commercial development. The economies envisaged have been fully realized in a plant now making 15 to 20 tons of reclaim a week.

No type of soft vulcanized rubber waste has yet been found to which the thermodynamic method cannot readily be applied. The total time of processing from raw waste to refined reclaim seldom exceeds 60 minutes. No oils, tars, bitumens or other softeners are used; yet thermodynamic reclaim is soft and silky when leafed. It offers marked advantage over many others in plasticity and ready processing. Unless a little more sulfur or accelerator is employed in the mix, thermodynamic reclaim may be slightly slower in cure, lower in modulus and higher in elongation than other types from the same scrap. Aging characteristics are claimed to be excellent.

Thermodynamic reclaiming is the subject of British and foreign patent applications. The necessary equipment is available, with slight modification, in many rubber factories throughout the country; but the process does not lend itself to the casual reclaiming of factory scrap in small quantities.

(EDITOR'S NOTE: According to one American reclaiming authority, the method suggested above is feasible, although it makes no mention of any method for removing cotton from the scrap. If adopted in this country, scrap rubber would have to be more carefully segregated than is now practiced).

Aluminum-Wool Rubber Brake Linings

IT has been generally considered that the use of asbestos as a matrix in brake linings is practically indispensable owing to the great heat frequently generated during operation of brakes. This material alone combines the necessary qualities of flexibility coupled with high heat resistance. The coefficient of friction of asbestos, however, is not particularly high.

As a replacement for asbestos compositions, tests described in the November issue of *Light Metals* demonstrated that a mass consisting of aluminum wool impregnated with rubber gives good results and possesses many properties superior to those of the usual asbestos compositions.

The successful use of a thermoplastic such as rubber under these unusual conditions appears to depend upon the high thermal conductivity of the aluminum wool with which it is combined. For use in automobiles, commercial motors, railcars and winding engines, such linings have proved successful.

Review of the German Patent Literature Relating to Synthetic Rubber

(Concluded from the December, 1943, Issue)

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Interrupting Polymerization (Short Stopping)

In the very early emulsion polymerization procedures the product coagulated due to the ineffectiveness of the emulsifier. Only when powerful polymerization catalysts were applied did it become necessary to inhibit their action after a certain desirable degree of polymerization had been achieved and to prevent further polymerization and oxidation during the various processing operations.

Luther and Heuck of I. G. Farbenindustrie (*86*) decompose hydrogen peroxide in an isoprene polymerization recipe by addition of a 10% sodium hydrosulfide solution, sodium formaldehyde sulfoxylate, stannous chloride, hydrazine. In a later disclosure (*86*) it is specifically claimed to interrupt the polymerization when 20 to 30% monomer remain unreacted because a more plastic and benzene soluble product is formed. The synthetic latex may be stabilized by compounds disclosed in the preceding patent or by aldol alpha naphthylamine.

III—Processing

The processing of synthetic rubbers has, early in their development, posed a series of problems quite different from the manufacturing steps encountered in natural rubber technology and was approached first by I. G. Farbenindustrie and the du Pont Company. Still, the progress made in synthetic rubber technology is based to a very considerable extent on the developments of the modern rubber industry. It is to be presumed that the German synthetic rubber, as of today, is a product of the cooperation of the German rubber industry, though the contribution of the latter has not been recorded in the German Patent Literature.

Stabilization of the early synthetic rubbers by amines and alkaline reagents, separation of oily low molecular weight polymers causing stickiness, has been dealt with earlier in this review. A Badische Anilin and Soda Fabrik patent (*87*) improves the sticky product of German Patent 287,787 by gentle air oxidation (3% oxygen uptake). Heinemann (*88*) claims an improvement of elasticity and nerve by dissolving a mass polymer in benzene, adding a protein (2% albumin) and heating until a uniform colloidal dispersion is obtained. Badische Anilin and Soda Fabrik (*89*) prevent resinification by imparting 1% of phenol or naphthol on the rolls to a Kondakow product. Accumulatoren Fabrik (*90*) improve the processability of the early synthetic rubbers by steaming for 3 hours at 120° C. followed by washing and kneading.

An I. G. Farbenindustrie patent (*91*) discloses coagulation of a synthetic latex by cooling to —15° C. for 1½ hours. After remelting, the aqueous phase can be separated mechanically from the coagulum and may be reused for the emulsification of fresh batches. A later patent (*92*) applies electrolytes, *e. g.*, saturated sodium chloride or disodium phosphate, which can be washed out more readily than acids. Anti-aging agents, *e. g.*, aldol alpha naphthyl amine, are emulsified in water and added to the synthetic latex prior to or during coagulation (*93*).

IV—Compounding and Vulcanization

Compounding and vulcanization recipes are summarized in the accompanying table. It will be noted that the first four examples deal with the pre-World War I period. The last example in the list claims considerable improvement of plasticity, elasticity and tack (the toxicity of phenyl hydrazine militates against its use).

Plasticizers, Extenders

Muller-Cunradi (I. G. Farbenindustrie) (*118*) applies polyisobutylene to improve the plasticity of insoluble emulsion polymerizates of butadiene. He also shows that polyisobutylene reduces the rigidity and brittleness of rubber chloride and various synthetic rubbers. Coal tar oil has been added to the extent of 100% to synthetic rubber in an early patent (*119*). Condensation products of thiodiglycol with cyclohexanone (approximately 20%) are kneaded with a butadiene-vinyl methyl ketone copolymer to increase processability and age durability (*120*). Kranzlein (*121*) claims the use of condensation products of maleic anhydride with unsaturated alcohols, *e.g.*, castor oil, prepared according to German Patent 449,965, as elasticators among others for polybutadiene. No example for the latter composition is given. I. G. Farbenindustrie has patented (*122*) a polymer from fractions containing cyclic diolefins, the use of which as an extender is suggested. Tensile strength and rebound values better than obtainable with factice are claimed.

An I. G. Farbenindustrie patent (*123*) discloses the use of certain non-heat hardenable isoprene polymers as plasticizers.

COMPOUNDING AND VULCANIZATION RECIPES

Inventor or Assignee	*Synthetic Elastomer*	*Compounding And Vulcanization Recipe*	*Physical Characteristics Of Vulcanizates*	*Claims*
1. Friedr. Bayer & Co.(*94*)	Dimethylbutadiene (heat polymer), sodium polymerized butadiene, isoprene	100 parts polymer, 10 parts sulfur, 1 part piperidine vulcanized 1 hour at 120-125°C. and 35 lbs. #	Soft and hard rubbers, depending on sulfur quantities applied	Piperidine and derivatives as vulcanization accelerators
2. Friedr. Bayer & Co.(*95*)	Dimethylbutadiene (polymerized in light at room temperature)	100 parts polymer, 0.75 parts piperidine, 10 parts sulfur	Soft rubber-like product	
3. Friedr. Bayer & Co.(*96*)	Dimethylbutadiene (polymerized in light at room temperature)	100 parts polymer, 50 parts sulfur, 1 part mono piperydyl urea, vulcanized at 155°C. and 70 to 84 lbs. #	Hard rubber	Piperidine derivatives as vulcanization accelerators
4. Friedr. Bayer & Co.(*97*)	Dimethylbutadiene (polymerized in light at room temperature)	100 parts polymer, 10 parts sulfur, 0.75 parts piperidine, vulcanized 1 hour at 120-125°C. at 35 lbs. #, or 15 minutes at 135-145°C. and 49 lbs. # steam pressure		Application of lower temperature or shorter vulcanization periods
5. Friedr. Bayer & Co.(*98*)	Dimethylbutadiene (polymerized in light at room temperature)	100 parts polymer, 10 parts sulfur, 1 part thiopiperidine, vulcanized 1 hour at 120-125°C. and 32 lbs. # steam pressure		
6. Friedr. Bayer & Co.(*99*)	Dimethylbutadiene (polymerized in light at room temperature)	100 parts polymer, 50 parts sulfur, 1 part tetramethylene diamin (pyrrolidin xanthate, dimethylamin xanthate, beta, beta' dimethyl-delta methyl-trimethylene amine) vulcanized 3 hours at 143°C.	Hard rubber	Application of high boiling aliphatic bases or derivatives of low boiling amines of high boiling point
7. Friedr. Bayer & Co.(*100*)	Dimethylbutadiene (polymerized in light at room temperature)	100 parts polymer, 10 parts sulfur, 1 part tetramethylene diamin (pyrrolidin xanthate, dimethylamin xanthate, beta, beta' dimethyl-delta methyl-trimethylene amine) vulcanized 3 hours at 143°C.	Soft rubber	
8. Friedr. Bayer & Co.(*101*)	Isoprene, Dimethyl-butadiene	100 parts polymer, 10 parts sulfur, 2 parts paraphenylene diamine vulcanized 15 minutes at 47 lbs. # steam pressure.		Use of amines of a dissociation constant over 10^{-9} as vulcanization accelerators
9. Badische Anilin und Soda Fabrik(*102*)	Ozonide catalyzed isoprene mass polymer prepared according to German Patent 271,849	100 parts polymer pretreated with 3% caustic soda on hot rolls or with organic acids or derivatives (acid potassium tartrate) is vulcanized 2 hours at 2½ atmospheres (gauge) with 10 parts S	From soft to hard rubber-like products are obtained	Vulcanization according to standard natural rubber practice of diolefin polymers pretreated with alkali, alcoholates, or acids
10. Badische Anilin und Soda Fabrik(*103*)	Ozonide catalyzed isoprene mass polymer prepared according to German Patent 271,849, pretreatment with acids increases swelling in benzene	100 parts polymer pretreated with 40 parts acid potassium tartrate on hot rolls, 10 parts sulfur, 10 parts magnesia, 1.5 parts piperidine, vulcanized 1 hour at 2½ atmospheres (gauge)	Product of considerable tensile strength is obtained	Vulcanization according to standard natural rubber practice applied to diolefin polymers pretreated with organic acids excepting aromatic acids
11. Badische Anilin und Soda Fabrik(*104*)	Ozonide catalyzed isoprene mass polymer prepared according to German Patent 271,849, pretreatment of benzene insoluble product with organic acids	50 parts polymer (French Patent 459,005), 20 parts potassium tartrate mixed on hot rolls (110-120°C.). After ¼-½ hour washed with warm dilute alkali and dried	Light grey sheet, the elasticity of which improves on storage	
12. Mittel deutsche Gummiwaren Fabrik(*105*)	Not specified	100 parts synthetic rubber, 100 parts coal tar oil, 10 parts sulfur, 25 parts zinc oxide vulcanized at 140° C. for 10 minutes	Elastic product	Use of coal tar oil
13. Tschunkur & Bock(*106*) I. G. Farbenindustrie A.G.	Emulsion copolymer dimethylbutadiene: butadiene 1:1	Compounded with 50-60% carbon black	Tire tread material	
14. Tschunkur & Bock(*107*) I. G. Farbenindustrie A.G.	Dimethyl-butadiene polymer	78 parts polymer, 20 parts carbon black, 3.15 parts sulfur, 9.4 parts zinc oxide, 1 part diphenyl guanidine, vulcanized at 140°C. for 50 minutes	100% improvement in physical properties	
15. I. G. Farbenindustrie A.G.(*108*)	Sodium polybutadiene	100 parts polymer, 7 parts montanic acid, 70 parts carbon black, 0.78 parts sulfur, 1.5 parts piperidine piperidyl dithiocarbamate, 1 part aldol alpha naphthyl amine vulcanized 70 minutes at 140°C. Montanic acid purified according to German Patents 409,420, 451,187, 558,437, 553,038, 563,394, 550,424	Tensile strength 220 kg./cm.² (3080 lbs./sq. in.), elongation 580%. Montanic acid and glycol esters increase plasticity and permits use of vulcanization accelerators, causes increased abrasion resistance, better ageing and water resistance	

(Table continued on following page)

COMPOUNDING AND VULCANIZATION RECIPES—Cont'd.

Inventor or Assignee	*Synthetic Elastomer*	*Compounding And Vulcanization Recipe*	*Physical Characteristics Of Vulcanizates*	*Claims*
16. Tschunkur & Bock(*109*) I. G. Farbenindustrie A.G.	Buna S type, butadiene styrene ratio 2:1	100 parts copolymer, 15 parts zinc oxide, 2 parts tar, 2 parts stearic acid, 50 parts carbon black, 3 parts sulfur, 1 part thiocarbanilid vulcanized at 2½ atmospheres (gauge) (35 lbs. gauge)	Tensile strength: 2800-4200 lbs./sq. in., elongation: 600-700%	
17. Tschunkur & Bock(*110*) I. G. Farbenindustrie A.G.	Emulsion polymer (albumin emulsifier)	100 parts polymer, 20 parts silica gel, 50 parts Dixie clay or finely divided magnesium carbonate are mixed with standard vulcanization ingredients.	Dixie clay increases tear resistance from 50 to 120 kg./cm² (1680 lbs./sq. in.), elongation from 400-500 to 600-700%. Similar increases with 60% silica gel	Replacement of carbon black by other fillers of particle size under 0.3 micron
18. I. G. Farbenindustrie A.G.(*111*)	Sodium polybutadiene, buna S, buna N, polyethyl acrylate	100 parts polymer, 5 parts stearic acid, 5 parts zinc oxide, 0.6 parts sulfur, 2 parts vulcanization accelerator, 50 parts carbon black (by detonation)	Tensile strength 2800-3000 lbs./sq. in., elongation 550-600%	Application of carbon black obtained by detonation of unsatur. hydrocarbon gases with amounts of oxygen insufficient for complete combustion
19. I. G. Farbenindustrie A.G.(*112*)	Buna N	130 parts Buna N, 70 parts epichlorohydrin-sodium polysulfide condensation product (German Patent 675,401), 50 parts iron-oxide, 20 parts zinc oxide, 1 part stearic acid, 2 parts sulfur, 1 part mercaptobenzothiazole vulcanized 60 minutes at 3 atmospheres	A product of excellent solvent resistance is obtained	Vulcanization of mixture of Buna N with polysulfide condensation product (German Patent 675,401)
20. I. G. Farbenindustrie A.G.(*113*)	Buna N, Buna S	100 parts Buna (S) N is mixed with 1.2 parts phenyl hydrazine (nitro-phenyl hydrazine, phenyl hydrazine oleate, tolylhydrazine) and dissolved in 400 parts benzene, and heated to 60°C. for 24 hours with air injection	Considerably improved plasticity elongation, tack, viscosity of benzene solutions reduced one-half, if 0.08% potassium ferriarabonate added	Improvement of washability and solubility of butadiene copolymers by adding before or during processing small amounts of asymmetric hydrazine derivatives, alternately with injection of oxygen and optionally together with oxygen transferring heavy metal salts.
21. I. G. Farbenindustrie A.G.(*114*)	Butadiene (heat polymer)	Polymerization in toluene solution carried out under pressure at 140°C. in presence of 1% of drier (chromium salts, peroxides, ozonides)	Coatings prepared from polymer solutions show markedly improved drying rates	Oxidation vulcanization
22. Otto Röhm(*117*)	Polyacrylate	Not given	Properties similar to vulcanized rubber are claimed	
23. I. G. Farbenindustrie A.G.(*115*)	Polyisobutylene	Polyisobutylene is kneaded with 2% vinyl carbazole and heated.	Tough, elastic rubber-like material. With higher vinylcarbazole additions the product becomes harder and less elastic	
24. I. G. Farbenindustrie A.G.(*116*)	Natural rubber and sodium polymerized butadiene	50 parts smoked sheets, 50 parts sodium polymerized butadiene, 38 parts sulfur, 29 parts factice, 2 parts diphenyl guanidine, 6 parts calcium oxide, 6 parts magnesium oxide, 137 parts pumice, vulcanized 90 minutes at 151°C.	Tensile strength: 3000 lbs./sq. in., flexural strength: 500 lbs./sq. in., heat resistance: 127° Martens. Values for natural product, 2800 lbs./sq. in., 480 lbs./sq. in., 82° Martens	

V—Rubber-Like and Plastic Masses

The characteristics of this group of polymers are not well defined. These synthetics, generally, possess some degree of elasticity. They are not particularly suited for tire building materials, but possess specific properties approaching or superior to natural rubber and reclaim and to synthetic rubber which suggest their application in certain fields.

In this group are recorded patents some of which do not appertain to the recognized synthetic rubbers and may in some instances be plastics rather than rubbers.

Polysulfide Condensation Products

The basic patent in the field of rubber-like masses formed by condensing sulfur-containing substances either with themselves or with other compounds has been filed by Jean Baer in Switzerland, October 20, 1926. The condensation of inorganic sulfides or polysulfides with dihalogen derivatives of unsaturated aliphatic hydrocarbons (*e. g.*, isoprene) is disclosed by the inventor in a German patent (*124*). By condensation with aliphatic aldehydes rubber-like products are also known to be formed (*125*). A series of improvements and refinements have been patented by Patrick (*126*) and by Mnookin (*126a*) for which U. S. patents have also been obtained, and which are, therefore, not summarized in this report. A natural rubber-polysulfide condensation product bonding agent, consisting of a natural rubber latex to which a carbon disulfide solution of polysulfide condensation product has been

added (*127*), the condensation products of alkyl dithiosulfuric acids or salts with polysulfides (*128*), and use of aromatics with dihalogenated side chains (*129*), the latter two patents by I. G. Farbenindustrie, fall in the category of polysulfide rubbers.

Polyvinyl Compounds

Ostromisslensky (*130*), at the Bogatyr Company, Moscow, observed that polyvinyl chloride and bromide possessed properties which are very similar to halogenated natural or butadiene rubber. By dehydrohalogenation with inorganic or organic bases, zinc and other metals capable of removing hydrogen halide, and even by heating under pressure in the presence of water or organic liquids, products similar if not identical with rubber-like polydiolefins were obtained.

Chemische Fabrik Griesheim-Elektron (*131*) claims polymerization of organic vinyl esters and in a supplement (*132*) discloses application of peroxidic and other polymerization catalysts. An earlier patent of this company (*133*) discloses the plastification of polyvinyl halides, among others, with cresol phosphate. Elastic substances (*134*) are obtained by heat polymerization of vinyl-methyl-ketone, methylene methyl ethyl ketone, prepared according to German Patent 222,551.

I. G. Farbenindustrie (*135*) discloses that upon alkali treatment polyvinyl-methyl-ketone becomes insoluble, but can be softened and molded. Plauson's Forschungsinstitut (*136*) covers an invention which teaches metal halide catalyzed polymerization of equal quantities of diolefins and drying oils. A non-sticky rubber is obtained. Reaction conditions can be modified to yield rubber, resins or terpenes. Felten and Guilleaume (*137*) polymerize compositions containing on the one hand diolefins, on the other coumarone, active phenol aldehyde resins, methacrylate in the presence or absence of catalysts, to yield elastic masses, softening below 100° C., and which can be used in place of balata and gutta-percha.

I. G. Farbenindustrie (*138*) obtain rubber-like products by heating vinyl esters with protein materials, optionally in the presence of peroxides. Highly purified vinyl ethers are polymerized preferably at low temperatures with isobutylene or diolefins and other elastogens under the catalytic action of boron fluoride to yield highly elastic products of fairly low softening point (*139*).

Another similar Farbenindustrie patent (*140*) discloses that depending on the nature of the comonomer, rigid to elastic vinyl ether copolymers can be obtained. Farbenindustrie has also found (*33*) that kneading small amounts of vinyl carbazol with polyisobutylene followed by heating yields rubber-like products.

Vegetable and Fish Oil Condensation Products

I. G. Farbenindustrie (*141*) has discovered that condensation of castor oil with maleic anhydride or acid yields a transparent rubber-like gel which is highly resistant against hot organic solvents, but is saponified on prolonged heating with alkali.

VI—End Uses

Among the patents on synthetic rubber reviewed for the purpose of this paper very few claim certain specific end uses. Disclosures are far more liberal regarding specific end uses.

Adhesives

Solutions of great adhesive strength are obtained according to Accumulatoren Fabrik (*142*) by heating synthetic rubber in air to at least its melting point and dissolving in organic solvents. I. G. Farbenindustrie (*143*) applies synthetic rubbers, particularly methyl rubber, as binding agents for linoleum, optionally applying vulcanization.

Substitutes for Rubber, Balata and Gutta-Percha

Röhm & Haas A. G. (*144*) mill polyacrylic acid, linoxyn, talcum and sulfur, to form a substitute for rubber and gutta-percha, which is insoluble in oil. Siemens & Halske (*145*) disclose the use of metal halide catalyzed diolefin-aromatics polymerization products as insulating materials for conductors of high frequency currents. The crude polymer is first heated and subsequently submitted in solution to purification by electrophoresis. Felten and Guilleaume (*137*) copolymerize diolefins with coumarone resins, active phenol formaldehyde resins, methyl acrylate, and obtain balata-like masses softening below 100° C.

Dynamit A. G. (*146*) describe a process of applying polyisobutylene for injection molding purposes. It is stated that on short heating to 130 to 150° C. the polymer becomes fluid without undergoing depolymerization.

Coatings

Solutions of butadiene polymers to which 1% iron penta carbonyl has been added, when brushed on surfaces, dry rapidly to thin vulcanized films (*147*). Rubber films can be vulcanized by exposure to the vapors of sulfur chloride (*148*). Vulcanization of numbered buna films can be effected by heating to 40 to 50° C. in air or oxygen (*149*).

Hard Rubber

Bayer and Company has disclosed in a series of patents (*150*) the preparation of hard rubber from dimethyl-butadiene polymers, and I. G. Farbenindustrie (*151*) suggests mixtures of natural and synthetic rubber (sodium polybutadiene) for making hard rubber. In a further patent (*152*) of this company it is disclosed that heating of sodium butadiene in the absence of air to 250 to 300° C. causes hardening. The product is claimed to be a very desirable electrical insulator, possessing an electrical resistance up to 80,000 volts/mm, a pressure resistance of 2,250 kg/cm², and a compressibility of 25%.

LIST OF REFERENCES

	Inventor or Assignee	Patent Number	Date of Application*	Date of Publication
(86)	Luther & Heuck to I. G. Farben. A.G.	543,152	7-18-28	2-1-32
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Micronized Commercially Pure Sulfur

THE relative suitabilities of ordinary ground sulfur and micronized sulfur, from the standpoint of ease of dispersion in GR-S, was recently investigated ("Compounding of Hard GR-S," RUBBER AGE, November, 1943). Of two batches prepared, one containing 50 parts of ground sulfur and the other 50 parts of micronized sulfur, photomicrographs of cut sections clearly indicated better dispersion in the case of the micronized sulfur.

Micronized sulfur is a product of the Micronizer Processing Co., Inc., Moorestown, N. J. According to information since received from that company, the material used in the tests referred to above is known as Micronized Commercially Pure Sulfur. This material is simply crude sulfur in the original state as received from the mine which has been crushed and processed in the Micronizer Reduction Mill. The processing results in a sulfur with a fineness, on the average, ranging from 4 to 5 microns in particle size.

It is claimed that sulfur processed to an extremely fine size, as in the case of this micronized material, results in improved distribution of sulfur throughout rubber stocks, this distribution, in turn, preventing small concentrations of sulfur in any given area of the rubber surface, thus eliminating excessive hardness in any particular area. Creation of hard areas in rubber stocks reduces the quality of the finished product.

The Micronizer Processing Co. also reports that it is now developing a micronized sulfur which will be superior to its Micronized Commercially Pure Sulfur. Known as Micronized CT, the new material is composed of 75 parts of sulfur and 25 parts of an inert filler which, for practical purposes, may be regarded as a clay, although the exact nature of the filler cannot be stated at this time. The filler has been added to increase the dispersing qualities of the product when compounded with rubber and, based on early results, inclusion of the filler apparently disposes of agglomerates which are known to occur when the ordinary micronized sulfur, as well as ordinary sulfurs, are used. This new type of sulfur is already being used by manufacturers of hard rubber products, but the company believes its further development will make it suitable for all-around compounding.

Micronized sulfur has been made possible by the development of a special jet pulverizer. The pulverizer, developed several years ago, utilizes a shallow circular grinding chamber wherein a circulating charge is acted upon by a number of gaseous fluid jets issuing through orifices spaced around the periphery of the chamber. Air or superheated steam may be used for grinding various materials. Grinding chambers vary from 12 to 36 inches in diameter and from 1 to 2½ inches in axial height at the periphery.

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Editorials . . . . . .

New Rubber Committee

IN accordance with the announcement made by the International Rubber Regulation Committee on December 28, as reported elsewhere in this issue, that Committee has ceased its regulatory functions and will soon be supplanted by "a new and more widely representative committee for consultation and collection of information. The regulation agreement officially expired at the end of 1943, but the Committee set-up has been continued for another four months, without the resumption of rubber regulations. There now remain but three signatories to the agreement—Britain, India and the Netherlands.

Extension of the agreement for an additional period to facilitate establishment of a more representative non-regulatory committee is generally accepted as indicative of the fact that both British and Dutch interests believe demand for rubber will be heavy enough for some time after the complete cessation of hostilities to support both natural and synthetic rubber production. This is a point which many leading rubber manufacturing authorities in this country, particularly John L. Collyer, president of Goodrich, have been stressing for months.

Based on the new angles thrown into the world-wide rubber picture by the creation of the gigantic synthetic rubber industry in the United States, these columns have repeatedly stressed the need for a new organization to be more widely representative of both suppliers and consumers of rubber. In the past, despite the fact that the United States was the major consumer of rubber, it had only an advisory voice in the operation of the regulation agreement. Actual voting power was in the hands of the signatories only, with Great Britain and the Netherlands possessing three votes each. Obviously, in its new position as a major supplier of rubber, albeit synthetic rubber, and whether such rubber is technically capable of competing with crude or whether it is used as a buffer to keep crude prices in line, the United States must have voting power in any new organization second to none.

This, of course, sets up a ticklish situation in the organization of any new committee, plus the fact that in accordance with its good neighbor policy in the Western Hemisphere the United States will probably insist on Latin America having some voice on the committee. Although we are primarily concerned today with getting as much "emergency" rubber as possible from Latin American countries, the long-range plantation program launched in various countries with the help of the United States government must not be disregarded.

Despite all the difficulties facing the organization of a new committee which would be more representative of all interests concerned, such a committee is a necessity in the post-war world. As we have stated before, if the British and American governments can collaborate successfully to wage war, they can equally collaborate to keep the peace. Rubber is an international commodity, demanding international treatment. The new committee must be formed with that point in view.

Post-War Programs

AN interesting commentary on the post-war status of the synthetic rubber plants was made last month by Ralph Wolf, formerly associated with the Rubber Director's office in Washington and now chief chemist of the Polson Rubber Co., on NBC's Town Meeting of the Air. Referring to the possibility that world-wide politics might halt the production of synthetic rubber in the United States, Mr. Wolf stressed the point that the great bulk of present equipment will not lie idle and fall apart from disuse. The butadiene plants can easily be converted to the production of other essential hydrocarbons, while the styrene plants will continue to make styrene for polymerization into plastics of the type for which a tremendous post-war demand is visualized. Technically, therefore, the American synthetic rubber industry needs little protection, tariff or otherwise.

CURRENT NEWS OF THE MONTH

FURTHER CONVERSION TO SYNTHETICS NOTED IN AMENDMENT ISSUED TO RUBBER ORDER

FURTHER conversion of the rubber industry to wartime use of synthetic instead of natural rubber was reflected in Amendment No. 2 to Rubber Order R-1, issued by the Office of the Rubber Director on December 23. The new amendment, which treats specifically with mechanical goods, was effective January 1. Typical examples of the numerous rubber products affected by the new directive are rubber hose, packings, and printing rolls. All items covered by the amendment reflect a prohibition of the use of crude rubber or show a reduction in the percentage of crude permitted in their manufacture. In general, the new regulation amends the rubber order as follows:

1. It eliminates use of crude rubber wherever possible, and reduces the amount of crude in products where use of some natural rubber is absolutely essential.

2. It eliminates the section of the basic rubber regulations which specified use of certain compound-grades (synthetic plus natural rubber) by the rubber industry. Specific percentages of crude rubber or latex have been substituted for each product which is permitted to be manufactured.

3. It reincorporates in the basic rubber regulations certain allowances for small-scale use of colored rubber for purposes of identification. The color-regulations were included in the original Rubber Order but were omitted from the order as amended December 4, 1943.

Farm Tire Control Transferred

The Rubber Order was further amended on December 24 to transfer control of original equipment pneumatic tires for farm machinery from WPB's Farm Machinery and Equipment Division to the ORD. The new section of the order is known as Amendment 3 to Rubber Order R-1, as amended, and imposes no new limitations on producers seeking to obtain tires for newly-manufactured agricultural equipment.

The types of such equipment covered by the amendment are: Wheel type tractors including garden type, combines, pick-up hay balers and field hay harvesters, corn pickers, and power sprayers over 10 gallons per minute.

According to WPB, the action represents simply an administrative action whereby an existing arrangement between the ORD and the Division of Farm Machinery is formally recognized by incorporation into the basic rubber regulations.

As a result of the new amendment, the identical restrictions previously contained in orders L-257 and L-257-a are now voided, but tires and tubes already authorized for farm machinery under these orders will not be affected.

Time Extended on Shoe Cements

An amendment issued on December 29 by the ORD to Appendix 3 of Rubber Order R-1, as amended December 18, granted a month's extension of the period within which shoe manufacturers may continue to use natural rubber shoe cements which they now have in stock. By February 1, all remaining stocks of such cements must be reported to the ORD in accordance with the program to convert the shoe manufacturing industry to the use of synthetic rubber cement. The cutoff date previously announced was January 1.

During the month's period of grace, all stocks of natural rubber cement may only be used in accordance with regulations earlier established by the ORD, which points out that synthetic rubber cements are already available as substitutes for the natural rubber cement which is being eliminated.

The amended appendix also prohibits the use of crude rubber or natural latex in the manufacture of x-ray cables after February 1 and provides for the manufacture of tire repair materials on a production preference basis identical with that which has been established for the production of camelback.

Synthetic Ordered for Pipe Rings

The wartime conversion of the industry from natural rubbers to synthetics was carried another step nearer completion on December 18 with the issuance by the ORD of Supplement 1 to Appendix III of Rubber Order R-1, as amended. The supplement provides that certain rubber equipment used in milking machines and in gas and water mains must be made only from synthetic rubber after February 1. The two items affected by the order are pipe rings (used to seal joints in gas and water mains) and milking machine inflations (elastic attachments which perform the same function as is performed by the fingers in manual milking).

Disposition of Compounds

The ORD is currently offering to assist all rubber manufacturers to dispose of left-over compounds of natural rubber originally prepared for use in the manufacture of products which are now made in large part from synthetics.

Manufacturers have been informed that they may submit statements of rubber compounds on hand for which they no longer have permissible use under the increasingly stringent restrictions of Rubber Order R-1. All such left-over compounds are to be reported, particularly those containing more than 1,000 pounds of natural rubber.

In requesting the reports, the ORD has stated that it will endeavor to assist the individual rubber manufacturers to dispose of the compounded material. It is anticipated that the channeling of these stocks from inventories into permitted uses will conserve substantial amounts of natural rubber.

Expansion Programs Rushed

With the urgent need for more tires for the war effort and for essential civilian transportation, the Eau Claire ordnance plant of U. S. Rubber Co. is speeding its plans to reconvert to tire production this year, Howard O. Hutchens, plant manager, has announced. It is expected that the first tires will be rolling off the finishing line by late Spring and that capacity production will be attained in the latter half of 1944.

"When our reconversion program is completed here and full production reached, Eau Claire will be one of the largest tire-building plants in the middlewest, with a capacity substantially greater than before the war," said Mr. Hutchens. "It should be emphasized that the immediate need now is for large size tires for combat vehicles and airplanes. These, along with truck and bus tires for essential civilian transportation, will be the only types produced here for the duration."

Basic tire-building equipment including Banbury mixers, vulcanizers, presses, molds, and calenders used for making various types of tires have already been purchased and will be installed as rapidly as possible, according to Mr. Hut-

chens. Additional buildings will be erected that will virtually double the plant's previous square footage, and new equipment will be installed throughout.

Previously known as the company's Gillette tire plant, a large number of men will be needed to complete the reconversion program and, Mr. Hutchens pointed out, in addition to all the rubber workers formerly employed there, several hundred additional will be needed to operate the factory. Chippewa Falls and Milwaukee, Wisc., will undoubtedly be drawn on for the additional labor, he indicated.

The Pennsylvania Rubber Co. started rush construction late in December of an addition to its main factory at Jeannette, Penna., which will increase its manufacturing capacity of synthetic rubber truck tires by approximately 30%, according to an announcement issued by Vice-President P. C. Mathewson.

"We are planning to rush the new building to completion in about four months' time to help avert the critical truck tire shortage which Rubber Director Dewey warns may come to a head in the next six months," Mr. Mathewson stated. The structure, for which ground was broken several weeks ago, is immediately adjacent to the present main building of the company's plant. It is of one story design and will provide at least 40,000 square feet of manufacturing space, according to the announcement.

A mill room addition to provide sufficient processed synthetic rubber for the new truck tire plant is also under construction on Pennsylvania Rubber's premises and this new project, according to Mr. Mathewson, will increase the synthetic rubber milling facilities by about 30% to keep pace with the needs of the enlarged truck tire production.

Contracts have been awarded and construction of the new General Tire & Rubber Co. plant at Waco, Texas, was scheduled to begin about January 1, according to Robert Iredell, chief engineer. The buildings will be ready May 1 and machinery is expected to arrive at that time, with actual tire production set for the late summer, Mr. Iredell said. The Waco plant will be confined entirely to truck tire building.

Additions to the main factory of General, at Akron, also are under way and will be built at a cost of $600,000, according to Mr. Iredell. They will include a new laboratory, a new office building, and additional milling capacity.

To help supply the needs for high strength rayon yarns for synthetic tires, construction has already begun on an expansion to the Front Royal, Va., plant of American Viscose Corp. which will more than triple its production of rayon tire cord and make the plant one of the largest producers of rayon in the Western hemisphere. The new facilities, consisting of modern mill buildings designed to match the existing plant, are expected to be in operation this year.

The contract for the main building for spinning, washing, drying and shipping, at Enka, N. C., in the tire yarn program of the American Enka Corp. has been awarded and construction work was scheduled to begin around January 1, foundations already having been completed. The contract is in excess of $100,000 and is one of a number being awarded by American Enka.

CEILINGS REDUCED ON SYRINGES AND BULBS; OTHER GOVERNMENT ORDERS

Reductions in ceiling prices of ear and ulcer syringes and double-end bulbs made of neoprene were announced by OPA at the turn of the year. In Amendment 13 to M.P.R. 300 (Maximum Manufacturers' Prices for Rubber Drug Sundries), issued and effective December 31, new differentials of 3 cents each for such bulbs and syringes under three ounces in size, and 4 cents for the three-ounce size are established.

Previously all neoprene double-end bulbs and ear and ulcer syringes had differentials over natural rubber bulbs of 5 cents each, regardless of size. This differential is continued for the four-ounce size of these bulbs.

The new ceilings, as well as ceilings for all other neoprene bulb goods, are to remain in effect until June 30, 1944, according to OPA. The ceilings for such goods have been on a temporary basis and were to have expired on December 31.

HEELS AND SOLES

Retail ceiling prices of 10 cents and 15 cents a pair on rubber heels sold to consumers who desire to attach them to shoes in their own homes have been established by OPA in Amendment 2 to M.P.R. 477 (Sales of Rubber Heels and Soles in the Factory and Home Replacement Trades), issued December 31 and effective January 7.

At the same time, OPA established dollars-and-cents ceilings for sales of these heels at wholesaler and manufacturer levels. Wholesale ceilings were set at 60 cents to $1.35 a dozen pairs, while manufacturer ceilings were established at 45 cents to $1.05 a dozen pairs.

Heretofore these heels, which are sold mainly by five and ten-cent stores and hardware stores, were subject to the General Maximum Price Regulation on all sales. Sellers then used their highest March, 1942, prices as their ceilings. The new specific ceilings approximate these March levels.

Rubber soles for attachment to shoes by the purchaser continue under G.M.P.R. for the time being but OPA hopes to establish specific ceilings for them in the near future, it is announced.

MECHANICAL GOODS

Whenever manufacturers of mechanical rubber goods have to pay the Defense Supplies Corporation more money for a material than they would normally pay a regular source of supply, they may add the difference in cost to their ceiling prices, according to Amendment 16 to M.P.R. 149, issued January 8 and effective January 14.

Only critical war materials would be purchased in this way. The added cost would be to compensate the DSC for extra handling charges incurred in purchasing and reselling the material. These materials, which are not now available from the regular source of supply, will represent a very small percentage of manufacturers' requirements, according to OPA.

It is specified that the mechanical rubber goods regulation applies to the covering of items with rubber. Previously the regulation had been interpreted consistently to include such operations. OPA now explicitly states that all of these operations, including the covering of rolls and the lining of tanks with rubber, are under the regulation.

The amendment also permits manufacturers to add to the ceilings for neoprene or Thiokol hose the extra charges that they had in effect on October 1, 1941, for cutting these two types of hose into short lengths and for performing any other operation associated with the manufacture of such hose for which they had an extra charge in that base month. Hitherto the regulation had been interpreted as permitting these various additions.

SCRAP RUBBER

A maximum price of 8 cents per pound, delivered, for pneumatic casing carcass fabric prepared for use in the manufacture of auto tire patches and reliners or as material for shoe soles was established by OPA in Amendment 9 to R.P.S. 87, as amended (Scrap Rubber), issued and effective January 6. Previously this material was not specifically priced by OPA, except as miscellaneous scrap rubber for which the ceiling price was ¾ cents a pound. Up to this time specific prices were not needed, for these transactions to which the new prices apply were not permitted.

The 8-cent price now provided for carcass fabric, according to OPA, is in line with its economic value, and makes allowances for specific production costs involved in sorting of old tires, splitting of the carcass fabric from the casing, and cutting to manufacturers' specifications.

At the same time, OPA announced a procedure for pricing rubber scrap where extra sorting and handling is involved. In sales of specially sorted articles of scrap rubber, other than tires, tire parts, or tubes, when sold to a consumer for use in manufacture of a product other than reclaimed rubber, the seller may submit a proposed price to OPA for approval. Previously no premium was pro-

vided for a dealer who sorted the foregoing material, and submission of a proposed price now permits the dealer to apply for such a premium.

ZINC OXIDE

Use of lead-free zinc oxide is not prohibited for rubber products made from natural or synthetic hydrocarbons in General Preference Order M-11-a, as amended, which places this material under allocation and lists its permitted uses. The amended order was issued by WPB on December 29 to become effective February 1. It exempts deliveries of two tons or less, but this exemption, it is estimated, will affect only about 5% of the total amount produced. The permitted uses cover not only the quantities under allocation but also shipments of two tons or less.

CAMELBACK PRODUCTION IS EXPECTED TO MEET ALL ESSENTIAL NEEDS

With the November production of camelback the largest on record, according to a statement issued last month by E. D. Wooldridge, manager of camelback and repair materials of the Office of the Rubber Director, future production is expected to be adequate to meet all essential needs for serving the tires of passenger and commercial vehicles.

"The demand for camelback still exceeds the production," the announcement said, "but, as promised by the ORD, the November production of camelback, both for passenger type and truck-type, was approximately 25,000,000 pounds, which is an increase of approximately 25% over October production and is the highest camelback production month in the history of the rubber industry. At the present time, plans are in effect to increase further monthly camelback production. It is anticipated at the present time that peak production will be reached some time in January."

The 25,000,000 pounds of retreading material produced during November was enough to recap 2,500,000 to 3,000,000 passenger tires and 500,000 heavy-duty commercial tires. The ORD estimated that at the close of 1943 there would have been distributed a total of 167,000,000 pounds of camelback for the recapping of passenger car tires, and 59,000,000 pounds of camelback for trucks, busses, and Army vehicles.

During the early period of the war, the production of camelback was hindered by a shortage of reclaimed rubber. At present, the production of retreading material is limited chiefly by a shortage of specialized milling and mixing machinery.

Shortage Reflected in Quotas

Shortage of new tires and tubes continued reflected in the rationing quotas for January, as announced by OPA. The quota for new truck tires is down 13,890 from the December quota, while the quota for new truck tubes is 27,787 under the December figure. These reductions were said to be in line with the policy of rationing the number of tires currently being manufactured for civilian consumption.

Similarly, a lessening in demand which usually occurs during the colder months accounts for lower January quotas for farm tractor and farm implement tires and tubes. The tire quota is 4,600 under the December figures, while the January tube quota is lower by 9,200. The January passenger tire quota is 63,972 above the allotment in December. The new quotas for used and reclaimed passenger car tires and for new passenger car tubes are virtually identical with those for December.

January's tire and tube quotas mark the beginning of the third year of rationing these commodities. On December 10, 1941, just three days after Pearl Harbor, all sales and stocks of tires and tubes were frozen and in January of 1942 tire and tube quotas under rationing were established for the first time.

This month's quota of 645,345 Grade I passenger and motorcycle tires compares with 581,373 in December; 829,425 Grade III tires compare with 829,350 in December; and 645,325 new passenger and motorcycle tubes compare with 645,477 in December.

The January quota of 276,629 new truck and bus tires compares with 290,519 in the previous month and the quota of new truck and bus tubes, 230,400, compares with 258,187 in December.

The January figure for farm tractor and implement tires, 27,600, compares with 32,200 in December and 23,000 tubes compare with 32,000 last month.

Amendments to Ration Order

OPA has issued three additional amendments to Ration Order 1-A (Tires, Tubes, Recapping and Camelback) since our last report, as follows:

Amendment No. 63, issued and effective December 13, establishes a plan of double-checking truck tire inspections to see that every tire in service gives its last possible mile of wear to essential commercial transportation before being replaced by a new tire drawn from dwindling stocks. The ORD, the ODT, and members of the tire industry are assisting OPA in setting up the plan. With truck tire inventories now below the accepted minimum, OPA will designate central truck tire inspection stations throughout the country in areas where truck registrations are heavy.

These central stations, to be privately owned and operated by men trained in tire care and conservation, will re-examine all tires recommended for replacement by official OPA tire inspectors within the area, and will search out and return to service tires still good for more miles of vital war-time transportation. Tubes to be replaced, however, need not be inspected by a central station. Fixed fees to cover operating expenses will be charged by the central station for its inspection. It is expected that central stations will be provided in about 200 cities throughout the country, covering a large percentage of truck registrations.

Amendment No. 64, issued December 23 and effective December 29, establishes three minor changes in the order, one of which establishes that a person may, without certificate, transfer tires or tubes to the Reconstruction Finance Corporation or to any corporation organized under section 5 (d) of the Reconstruction Finance Corporation Act, as amended, or any representative designated to receive tires or tubes on their behalf.

Amendment No. 65, issued and effective December 31, provides that tire dealers who had in stock on December 31 less than six passenger car tires and no truck tires or tubes need not file the quarterly inventory report called for on that date. About 40% of all dealers are affected, OPA estimates.

SYNTHETIC RUBBER SYMPOSIUM TO FEATURE A.S.T.M. MEETING

The 1944 Spring Meeting of the American Society for Testing Materials, which will be held either on Wednesday or Thursday, March 1 or 2, at the Netherland Plaza Hotel in Cincinnati, Ohio, will feature a technical symposium on synthetic rubbers and their uses. A.S.T.M. Committee Week will be held in Cincinnati beginning February 28 and probably extending through Friday, March 3.

The symposium is aimed at furnishing latest reliable data to users of synthetic rubber products, to aid in proper application, precautions to be taken, expected service, and similar problems. The technical papers to be presented and their authors are now being arranged for and the complete list will apear in our next issue.

A special Symposium Committee has been appointed, headed by Arthur W. Carpenter, manager of testing laboratories, B. F. Goodrich Co., as chairman, and the following members: S. Collier (Johns-Manville), H. L. Ebert (Firestone), H. M. Frecker, Jr. (U. S. Rubber), O. M. Hayden (DuPont), J. H. Ingmanson (Whitney Blake), E. G. Kimmich (Goodyear), I. E. Lightbown (Stanco Distributors), S. M. Martin, Jr. (Thiokol), W. J. McCortney (Chrysler), W. D. Parrish (Hycar), and G. H. Swart (General Tire).

In addition to the above, W. H. Gardner, representing A.S.T.M. Committee E-6 on Papers and Publications; Gerald Reinsmith, of the Office of the Chief of Ordnance, U. S. Army; and T. A. Werkenthin, of the Bureau of Ships, U. S. Navy, are also members of the special committee.

RUBBER INDUSTRY EXECUTIVES SEE 1944 AS CRITICAL YEAR

Pointing out that as the old year ended the country found itself with an impressive armed force on land, on sea, and in the air, having accomplished the twin tasks of training a large military force for attack and organizing facilities for the production of vast quantities of war materials, industry officials expressed the opinion at the turn of the year that the tides of war have definitely changed and that the enemy has switched from offensive to defensive action. But the war is not yet won, they cautioned, and there can be no relaxing of effort either on the fighting fronts or on the producing fronts.

"To my mind the most pressing tasks for America's home front in the months ahead are in the fields of airplane, food, and tires," said P. W. Litchfield, chairman of the board of the Goodyear Tire & Rubber Co. "Production of all three must be sharply accelerated to meet the evolving needs of a victory-bent America.

"We expect to convert facilities which can be spared from the production of all guns and bullets to the production of tires and other needed rubber goods for civilian and military uses," he said. "With the nation's tires gradually wearing out it is imperative that replacements be provided in order to keep essential cars on the roads."

Civilian Shortages to Continue

"Heavy demand for military tires and other rubber products indispensable to the armed forces may result in continuing shortages of many vital and essential rubber articles for civilian use during 1944," stated John L. Collyer, president of the B. F. Goodrich Co. Referring to a report from the office of the Rubber Director that the nation's stockpile of crude rubber at the close of 1943 had declined to approximately one-fourth of the Pearl Harbor level while anticipated new imports during 1944 will amount to no more than 80,000 tons unless rubber-producing lands are recaptured from the Japanese, Mr. Collyer asserted that the nation must now rely mainly upon synthetic rubber and that there will be further reductions in the proportions of natural rubber used in most products in which it is still employed. The synthetic rubber manufacturing industry should achieve its rated annual capacity of approximately 800,000 tons by July of this year, he said.

Despite the greater supplies of synthetic rubber as a result of the government contruction program nearing completion, however, the nation entered 1944 with its rubber dilemma still acute, in the opinion of Vice-President R. P. Dinsmore of the Goodyear Tire & Rubber Co. Although hailing the synthetic rubber plant construction program as "a modern miracle" in the light of its near completion in less than two years, Dr. Dinsmore asserted: "Now we are entering on another just-as-difficult phase, the perfection of the plants' products to permit greater improvement of articles already using synthetic rubber, and conversion to synthetic from natural rubber, as quickly and feasibly as possible, of many articles still being made with the latter."

The rapidly expanding tire production program of the industry and research work that may bring a solution to many synthetic rubber problems were stressed by John W. Thomas, chairman of the board of Firestone Tire & Rubber Co.

"I have confidence that in 1944 our research department will continue to find new and better ways to use synthetic rubber, and it may well be that new and better synthetic rubbers for tires will also reward their efforts. We enter the new year with production goals that constitute a real challenge," Mr. Thomas said.

O'Neill Urges "Full Day"

Declaring that "the all-important job that faces us today is one of turning out every tank and gun and tire possible," William O'Neil, president of General Tire & Rubber Co., pointed out that "we must not be looking so far ahead that we do not see the job to be done right away. We are altogether too confident of an early victory, management and labor alike. "True," he said, "we must plan for the future, but let's concentrate on production and leave postwar planning for the hours after a full day's work is done."

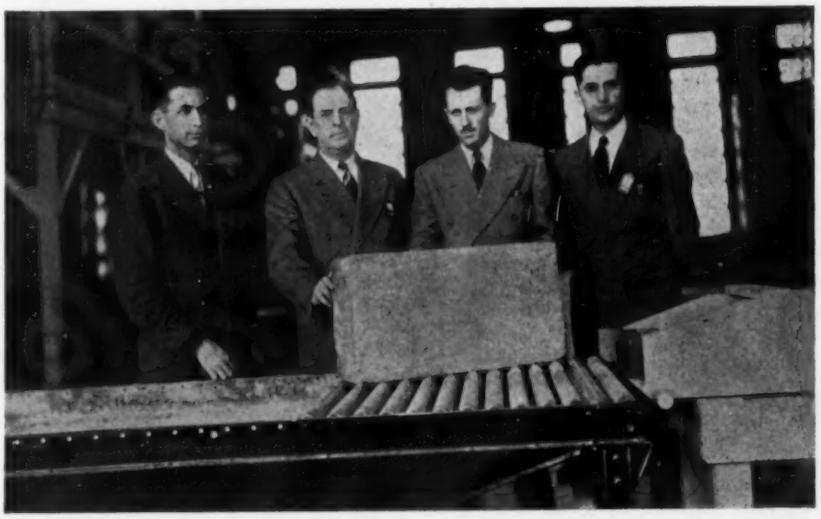
"Our first responsibility right now is to turn out all types of tires for combat vehicles and airplanes," declared Herbert E. Smith, president of the U. S. Rubber Co. "Our second concern is with the production of truck and bus tires for essential domestic transportation." The rubber industry is proving itself under wartime conditions by increasing production of materials needed for both military and essential civilian use, he said.

Seiberling Sees Crucial Period

The 12 months just ahead will comprise the most difficult and the most crucial year of the war, in the opinion of President J. P. Seiberling of the Seiberling Rubber Co. "It is the year to knock out Germany. Supplies must be sent to all present theatres of war, and to others to be opened, in a steady, increasing stream," he said.

That the wartime accomplishments of American chemists would "stand up" after the war was emphasized by President Charles A. Higgins of the Hercules Powder Co. "The war has simply accelerated the development of the chemical industry," he said. "Some of the so-called substitutes are better than what they have replaced. Under the impetus of war, these materials have been moved from the research laboratory into actual use much faster than would have been possible under a peacetime economy. But they are here to stay, and they will play a prominent part in raising the postwar standard of living."

INSPECT FIRST SYNTHETIC BALE AT FIRESTONE'S PORT NECHES PLANT



The first bale of synthetic rubber produced at the 60,000-ton-a-year plant of the Firestone Tire & Rubber Co. at Port Neches, Texas, is being examined above by company officials, who are, left to right, W. H. Cain, technical manager; K. K. Wyatt, plant manager; E. T. Handley, general manager of all Firestone synthetic rubber plants; and Henry Koehler, Jr., production manager. The recent opening of its Port Neches plant raises Firestone's production capacity of synthetic rubber to 150,000 tons annually. The company also operates synthetic rubber plants in Akron and in Lake Charles, Louisiana.

RUBBER WORK OF A. S. T. M. REVIEWED IN SPECIAL REPORT

Committee E-9 on Research of the American Society for Testing Materials recently issued a special report reviewing major research activities either currently being carried on by the various groups of the Society or in some cases projects which may be practically completed but which have not been previously included in any review. The section of the report referring to the work of Committee D-11 on Rubber Products follows herewith:

Automotive Rubber (Technical Committee A)—Extensive investigative work carried out by this group has involved a suitable hardness testing machine, requirements for motor mountings in which over 1400 determinations were made in cooperative tests, and research work on bumpers which has included load deflection and impact tests and heat failure of bumper stocks. Work has resulted in important standards including testing automotive hydraulic brake hose (D-575) and testing automotive air brake and vacuum brake hose (D-622), and, just this year (1943) standard tests for low-temperature brittleness of rubber and rubber-like materials (D-736). Research is being continued to develop more comprehensive tests for low-temperature properties. Another phase of this work involves automotive fan belts made from synthetic rubber. Because it has been difficult to select a suitable laboratory test, a field service investigation is under way. (See 1942 and 1943 Committee D-11 Reports.)

Analysis of Rubber Products

Chemical Analysis of Rubber Products (Sub-Committee XI)—Several research projects have been completed to develop satisfactory analytical methods for determining various elements (see 1938, 1939, 1940 *Proc.* for discussion). Modernized methods of chemical analysis issued as tentative in 1940. 1941 and 1942 cooperative tests covered determination of cellulose and carbon black in rubber compounds. A new section on methods of analysis for synthetic rubber has been organized and work is under way—latest report circulated in sub-committee. For technical paper see January, 1943, *Bulletin*, "A Direct Determination of Rubber Hydrocarbon by Chromic Acid Oxidation Method," Messrs Burger, Donaldson, and Baty. This method is to be issued as an alternative A.S.T.M. tentative procedure.

At the June meeting, recent reports on variations in analysis of rubber and sulfur, including the copper gauze method and free sulfur, were discussed. Subcommittee to study this material and to submit any relevant data so that adequacy of present requirements can be determined. Committee also discussed determining cellulose in carbon black, in which field much previous work was done. Committee realizes various activities comprise rather ambitious program, but will make all progress possible.

Aging or Life Tests of Rubber Products (Sub-Committee XV)—Accelerated aging tests of various types of rubber compounds in comparison with natural aging of the same samples. Previous methods of test for accelerated aging of vulcanized rubber separated in 1940 into procedures by oxygen-pressure method (D-572) and oven method (D-573). Method for air pressure heat test of vulcanized rubber (D-454) adopted.

Method of testing rubber compounds for resistance to light checking and cracking (D-518-38 T) issued (1938 *Proc.*). A cooperative test program conducted to determine the uniformity of aging in the various types of apparatus currently used in different laboratories completed; for conclusions see 1939 *Proc.* For discussion of methods of testing rubber compounds for resistance to accelerated light aging and of calibrating light source used see 1940 *Proc.* 1942 report gives extensive discussion by J. H. Ingmanson on investigation of artificial light aging of rubber, with the conclusions from research work undertaken, and various data. Draft of method for calibrating a light source used for accelerating the deterioration of rubber was discussed at the June meeting and is to be referred to the Society for publication as a tentative standard.

Packings (Rubber and Rubber-Like Materials) (Sub-Committee VI)—Based on studies of several years, including thorough surveys of the field, methods of testing compressed asbestos sheet packing (D-733) was issued in 1943. Further studies to cover effect of varying humidity conditions. This type packing is used for a variety of purposes, but particularly for aircraft engines. The sub-committee is working on treated paper packings. In 1941 series of technical papers presented, at March committee meeting (See 1941 *Proc.*). For interesting paper on "Machines for Testing Reciprocating Packings," by F. C. Thorn, see May, 1942, *Bulletin*.

Properties of Rubber and Rubber-Like Materials in Liquids (Immersion Tests) (Sub-Committee XIX)—Rather extensive research investigations on evaluating materials for oil resistance covered in 1934, 1935, 1937 *Proc.*; also methods for changes of properties of rubber and rubber-like materials in liquids issued (D-471). Later discussion resulted in recommendation to use three standard petroleum-base test oils with specified aniline points. Sub-committee is continuing work to develop narrower specification limits for oils used, and to establish requirements on motor fuels for use in immersions tests. Two reports from the United States Navy Department, Bureau of Shipping, were distributed to sub-committee covering "Solvents and Water Permeability Apparatus for Impregnated Fabrics" and "Report of Tests on the Effect of Temperature on the Solvent Resistance of Synthetic Rubber Vulcanizates."

Bonding Rubber to Metal

Adhesion of Rubber to Metal (Sub-Committee XX)—Based on extensive earlier research work, test for adhesion of rubber to metal issued (D-429). Data resulting from cooperative tests published, 1938 *Proc.* There is renewed interest on effect of shape of test specimen and studies are now getting under way to try to improve requirements for specimens, particularly for soft, stretchy stocks.

Testing of Liquid Rubber Products, Cements, Latex, etc. (Sub-Committee XXI)—Work previously done resulted in methods of test for viscosity and total solids content, D-553, see 1939 *Proc.* Present work is to develop minimum number of tests required to determine adhesive properties. Study of other viscosity test methods than D-553 temporarily held in abeyance. Extensive work by sub-committee sections resulted in agreement on necessary tests for adhesive properties including: (1) initial film strength, (2) ultimate film strength, (3) applicability (usability, brushability, sprayability, etc.), and (4) bonding range.

Sponge Rubber (Sub-Committee XXII)—Present emergency has stressed necessity of specification requirements for various types of sponge rubber. At the June meeting proposed general specifications were drafted but sufficient data in some cases must be supplied by a cooperative testing program. Active work will involve chemically-blown sponge rubber and closed cell type with objective of issuing emergency specifications. Efforts will be made to obtain data on foamed rubber latex sponge rubber. Methods of testing these products first issued 1939, now D-552-43 T.

Hard Rubber and Hard Rubber Products (Sub-Committee XXIII)—1938 and 1940 *Proc.* discuss briefly extensive cooperative testing programs. Methods of testing issued, D-530, also procedures for evaluating battery containers, D-639. Studies will probably result in modification of latter standard. Extensive round-robin tests by 11 laboratories for tensile properties, as covered in D-530, showed considerable variation. Additional studies will be made on effect of variables.

Additional Sub-Committee Work

Rubber Coated Fabrics (Sub-Committee XXIV)—Very active program of work outlined at June meeting. Properties which need evaluating include abrasion resistance, scrub resistance, light aging, and gas permeability. Committee will discuss tests on Taber abrader for comparison with other machines. Tests reported by various laboratories with the scrub machines were inconsistent and committee hopes to have a machine designed for cooperative work. It will expedite this program because of urgent need of tests. Proposed new tentative standards will cover other tests previously investigated including breaking, and bursting strength and elongation, tear resistance, hydrostatic resistance and adhesion of coating to fabric.

Low Temperature Tests of Rubber and Rubber Products (Sub-Committee XXV) —With intense interest in the low-temperature characteristics of rubber and non-rigid plastics, a new sub-committee was organized in March, 1943, and based on a thorough survey promptly developed the tentative tests for low-temperature brittleness (D-736-43 T). This has been approved by Technical Committee A for use in evaluating resistance of freezing temperatures of rubber and rubber-like materials for use in automotive products. The sub-committee has adopted a comprehensive program of work. Four types of tests will be investigated, based on the following characteristics: (a) brittleness, (b) hardness and modulus, (c) loss of resilience, and (d) fatigue and flexing. In each project the respective committee will select the most suitable test and attempt to standardize it with the type of cold box specified only by performance. Temperatures down to —70° F. must be considered (see 1943 *Proc.).*

Ontario Group Hears Mathewson

"Vinyl Resins in the Rubber Industry" was the subject of a paper delivered by K. B. Mathewson, of Canadian Resins & Chemicals, before the Ontario Rubber Section of the Canadian Chemical Association at a meeting of that group held at the University of Toronto, Toronto, Canada, on December 16. Mr. Mathewson described the chemical composition of the various vinyl resins and dealt with their physical characteristics and commercial uses. The application of the resins in adhesives, soles, special hose, proofed goods, window channels, molded goods, and wire covering was discussed and slides were shown which illustrated some of the uses mentioned in the paper. The meeting was attended by 50 members.

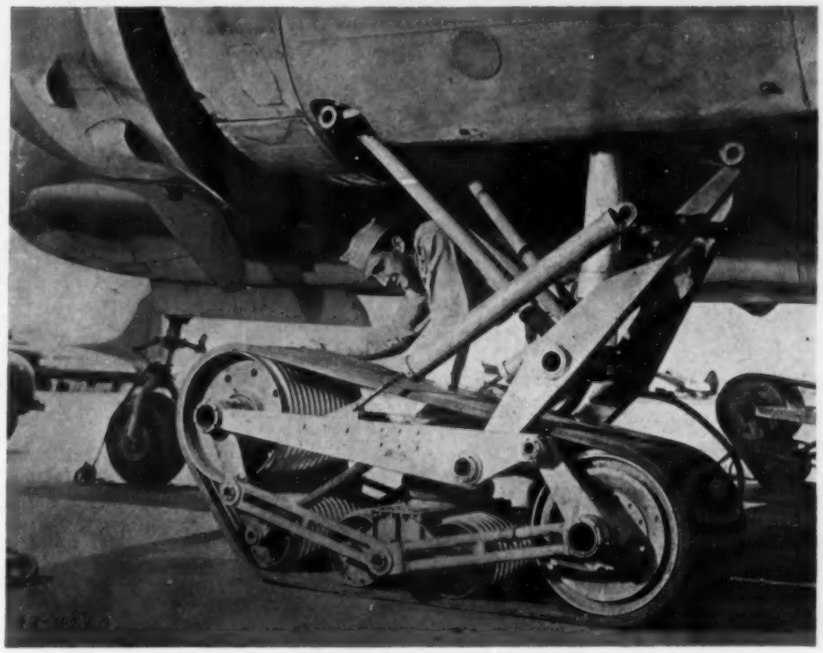
Pioneer Rubber Erects Addition

The Pioneer Rubber Co., Willard, Ohio, is adding another building to its plant. The new addition under construction is 60 x 150 feet, one story, and will house equipment for the manufacture of synthetic rubber gloves. The company's plant in Willard now occupies seven buildings. The new structure is being erected of blocks made by Pioneer employees from cinders from the power house. Pioneer operates a branch factory at Attica, Ohio.

New Standards List Available

A new list of standards has been published by the American Standards Association and is available on request at the offices of the association, 29 W. 39th Street, New York City. More than 600 standards are listed, of which 64 have been approved or revised since the last price list was printed, in April, 1943.

"FLYING RUNWAY" DEVELOPED BY FIRESTONE TO AID IN DIFFICULT PLANE LANDINGS



Landing on soft ground, rough terrain, and deep sand—all part of the worries of an airplane pilot—will hold little fear in the future, according to Army Air Force officials. A caterpillar type landing gear, known as the "flying runway" and similar to the tracks used on tanks, has been developed by engineers of the Firestone Tire & Rubber Co., in cooperation with the Army aircraft laboratory, and is going through intensive tests at Wright Field.

Firestone engineers cooperated with the Dowty Equipment Co., which was experimenting with a gear of the lever suspension type, and the track has a suspension, or linkage, it is explained, which prevents impacts from becoming too severe at any one point of contact.

Because the landing area is wider and flatter, planes of all types will be able to land on rough ground, according to Firestone. In describing the tread, engineers state that with the same amount of rubber that goes into a regulation landing tire, the new tread gives the plane four to eight times the area of contact on the ground. Planes equipped with the new gear have landed at 120 miles per hour and indications are that higher landing speeds will undoubtedly be possible.

The new gear is constructed with steel bracing and grooved aluminum bogie rollers. The rubber track has a wire beading on the edges and also is grooved to fit into the roller grooves, thus preventing side-slippage. A Firestone air spring is used for partial cushioning of the landing impact.

Designs New Friction Meter

Edwin C. Dreby, formerly research associate of the American Society for Testing Materials, and now associated with the National Bureau of Standards, has designed a friction meter for evaluating the coefficient of friction, a characteristic important in the "feel" of fabrics, and the instrument has been developed by the A.S.T.M. and the Bureau of Standards which, with the support of the textile industry, have been seeking to develop test methods and instruments for evaluating fabric finishes.

The consumer of fabrics is interested in their smoothness, "sheen," "creep," and wear—characteristics that are associated with a fabric's frictional properties. New fibres and improved finishing agents developed for the production of fabrics more acceptable to the consumer require adequate means for evaluating their effectiveness.

The coefficient of friction between the surfaces of two fabrics is a measure of resistance to slippage, a characteristic that is readily appreciated with the hands, and the Dreby meter can be used to determine the coefficients of friction of a wide variety of fabrics, to evaluate finishing agents, and to control processing with respect to the frictional characteristics of fabrics.

An illustrated wall chart showing in detail the proper way to mount synthetic rubber tubes is being offered free to all tire service stations, dealers, garages, and distributors by the U. S. Tire Division of U. S. Rubber Co., 1230 Sixth Avenue, New York City.

NEWS IN BRIEF

U. S. Rubber announces that the second booklet in its program designed to help recappers and repairmen in the job they have to do in 1944 is off the press. Entitled "Steam Supply Systems and Curing Schedules," the 20-page booklet explains why the proper steam supply system can accurately control the cure and greatly increase the quality of the average shop's synthetic repairs and recaps, according to the company. Copies may be had on request to U. S. Tires, 1230 Sixth Avenue, New York City.

Use of synthetic rubber for gasoline-absorbent "overcoats" on bullet-sealing fuel tanks in warplane wings has been disclosed by Goodyear. Large quantities are now being supplied several airplane manufacturers for the light weight overcoats, according to W. C. Winnings, manager of the company's mechanical goods division. The "overcoats," according to Mr. Winnings, can absorb any slight amount of gasoline which may escape from a fuel tank after it is pierced by a bullet and before the hole seals itself.

Running Gear hydrocarbon cleaner, described as an emulsifiable type cleaner that has been designed for quick removal of oils and solid particle dirts and greases, especially those which are very hard and caked on, has been introduced by the Technical Process Division of Colonial Alloys Co., Colonial Philadelphia Building, Philadelphia, Penna. According to the manufacturer, Running Gear is an ideal cleaner for metals in general.

Between 30,000 and 40,000 copies have been printed of a catalogue listing 441 items which can be obtained from the 830 Army Air Force Depot at Memphis, Tenn. Of interest to rubber manufacturers are items of rubber hose for use with gasoline and other fuels in a wide range of sizes from ¾ to 3½ inches and in various lengths with and without couplings. Copies of the catalogue may be obtained by applying directly to the Memphis Depot.

Cadet Skin Kote Creme, product of Cadet Creme Co., Worcester, Mass., referred to as "invisible work gloves for industry," according to the manufacturer affords protection against a wide range of irritating factors. The company also is marketing Cadet Waterproof Creme, which it describes as being formulated to protect the skin against certain acids, alkalis, and caustics in dry and aqueous forms, as well as miscible compounds, etc.

An interesting series of articles on the crude rubber situation in Latin America, based on a personal tour of the entire rubber producing area in that section of the world, recently appeared in the *Akron Beacon Journal* under the by-line of Charles C. Miller. We believe rubber manufacturers will be interested in this series and suggest they try to secure a complete set.

An attractive four-page bulletin on GR-I (Butyl) Rubber Dispersions has been made available by Dispersions Process, Inc., 1230 Sixth Ave., New York City. A similar bulletin on Buna S (GR-S Modification) Latex is also available from the Naugatuck Chemical Division of U. S. Rubber Co. at the same address.

Chemical engineers at U. S. Rubber's Mishawaka, Ind., plant are perfecting important peacetime uses for plastic board, a new material that, due to the fact that it retains its properties over a wide range of temperatures, is already in wide war use. Plastic board is now the principal material used to support bullet-sealing fuel cells in airplanes and it is also used in the manufacture of many de-icer tanks. Light in weight, it is also a non-conductor of electricity, will stand excessive vibration, and is not affected by gasoline, oils, acids, alcohol and other solvents. It may be bent, cut, and formed into almost limitless shapes.

The Asbestos Fibre Spinning Co., North Wales, Penna., has been absorbed by Greene, Tweed & Co., New York City. Both concerns have long been active in the asbestos field, and the North Wales company has been a consumer of rubber for some years, the rubber being used in connection with some of its asbestos items.

U. S. Rubber is offering to dealers and recappers an instruction booklet on recapping and repair of tires with synthetic camelback. The manual is graphically illustrated and gives step by step directions, the repair of synthetic inner tubes also being covered. Copies may be had on request to the tire division of U. S. Rubber, 1230 Sixth Avenue, New York 20, N. Y.

Firestone's radio program, the Voice of Firestone, recently observed its fifteenth anniversary. Since 1928 the program has enjoyed popularity and, by signing Lawrence Tibbett in 1932, became the first to present a Metropolitan opera star on a commercial broadcast.

Goodyear's 350,000,000th Tire

In the above reproduction, P. W. Litchfield, chairman of the board of the Goodyear Tire & Rubber Co., Earl Boston, press-man, W. S. Wolfe, factory manager, and E. J. Thomas, president, in that order, watch as the 350,000,000th tire is taken from the individual vulcanizer in the company's tire room at Akron. It was a 13.50-32 tractor type pneumatic tire.

A pension insurance plan has been adopted by the Johnson Rubber Company, Middlefield, Ohio, on behalf of its employees. Through it, a salaried employee may retire at the age of 65 if he desires to do so.

One hundred typical statements from responsible management officials on the operation of their labor-management committees are contained in a 38-page booklet just issued by War Production Drive headquarters. Copies of the booklet, which is entitled "100 Industrialists Report," may be obtained from the headquarters, at 3014 Municipal Center Building, Washington, D. C.

Nylon for post-war slide fasteners that will withstand rigorous laundering conditions, including cleaning solvents and ironing temperatures, is among uses foreseen for a new form of the material developed for special military applications. The new nylon is designated as FM-1 by the plastics department of DuPont, which developed the formula as a molding powder. The new nylon is said to be of interest to plastic molders because of the ease with which it is injected into thin sections and the facility with which it flows around complicated inserts in molds.

Binney & Smith Co., 41 E. 42nd Street, New York City, has issued Bulletin No. 128 containing the carbon black nomenclature recently agreed upon by the Carbon Black Nomenclature Committee, together with the official symbols and the Binney & Smith types which apply.

STANDARDS AND REVISIONS ARE ANNOUNCED BY A.S.T.M.

Several new standards and emergency actions of the American Society for Testing Materials were recently approved by Commitee E-10 on Standards. These covered various materials, including rubber. In addition to the two new tentative methods of testing rubber compounds for resistance to accelerated light aging (D-750) and calibrating a light source (D-749) developed by Committee D-11 on Rubber Products, a revision has been accepted in the Emergency Specification covering rubber sheath compound for cords and cables (ES-6) and four tentative methods have also been revised covering the following:

1—Testing Asphalt Composition Battery Containers (D-639-43-T)

2—Chemical Analysis of Rubber Products (D-297-43-T)

3—Test for Changes in Properties of Rubber and Rubber-Like Materials in Liquids (D-471-43-T), and

4—Testing Compressed Asbestos Sheet Packing (D-733-43-T).

Both new methods were first published in August, 1940, to stimulate comment and criticism and changes were incorporated based on considerations of certain of the requirements. The test for light aging covers various types of equipment available commercially and is intended as an accelerated test applicable for estimating the comparative resistance of soft vulcanized rubber compounds to deterioration when exposed to light having a frequency range approximating that of sunlight but a greater intensity in the ultra-violet range than sunlight. This method is not intended to cover the testing of materials ordinarily classed as hard or semi-hard rubber. The calibration method is intended primarily for use in measuring the intensity of radiation from the light sources used in connection with D-750.

These new tentative standards will be included in the 1943 Supplement to the Book of Standards, Part III, and will also be included in the Special Compilation of Rubber Standards (publication date was set for late in December) and they will be available separately in a few weeks.

Explanation of Revisions

While the change in ES-6, formerly covering rubber sheath compound for electrical insulated cords and cables where extreme abrasion resistance is not required, seems relatively minor (elongation at rupture, change from 350 to 300 min. per cent), it has the effect of making the requirements applicable to the GR-S type of sheath compound. Thus ES-6 as originally issued was a specification for rubber which is not now available but as now modified ES-6a covers the GR-S synthetic compound.

Perhaps the most important of the changes made in testing asphalt composition battery containers involves the determination of manganese which is extremely important in this product. All the changes are considered improvements over the present techniques.

In the methods of chemical analysis, D-297, in which field Committee D-11 has done outstanding work, a new method has been added covering the direct determination of rubber hydrocarbon which heretofore has been estimated by difference. The new method was published in the January, 1943, *ASTM Bulletin* and has been widely used during the past year, particularly for determining the rubber hydrocarbon value of reclaimed rubber.

Changes in the test for materials in liquids, D-471, establish three standard oils for use in immersion tests covering a range of swelling characteristics. Only one has been given heretofore. This is a definite improvement and is badly needed.

Since information recently developed indicates that properties of compressed asbestos sheet packing covered in D-733 are affected by moisture absorption, it is important that there be included specific details of conditioning of specimen before testing. Consequently provision has been inserted for conditioning in an oven at 212° F. for one hour followed by cooling to room temperature in a desiccator.

Feb. 4. Akron Rubber Group, Portage Hotel, Akron, Ohio.

Feb. 4. Chicago Rubber Group, Morrison Hotel, Chicago, Ill.

Feb. 8. Los Angeles Rubber Group, Mayfair Hotel, Los Angeles, Calif.

Feb. 11. Montreal Rubber Group, McGill University, Montreal.

Feb. 28-Mar. 3. A.S.T.M., Spring Meeting, Netherland Plaza Hotel, Cincinnati, Ohio.

Mar. 10. Montreal Rubber Group, McGill University, Montreal.

Mar. 14-15. N.A.W.M.D., Annual Meeting, Hotel Astor, N.Y.C.

March. 28-30. Tenth Annual Chemurgic Conference, St. Louis, Mo.

Apr. 3-7. A.C.S., 107th Meeting, Cleveland, Ohio.

Apr. 26-28. Rubber Division, A.C.S., Spring Meeting, Hotel Commodore, New York City.

June 26-30. A.S.T.M., 47th Annual Meeting, Waldorf Astoria, N.Y.C.

Pharis Acquires Molded Materials

The Pharis Tire & Rubber Co., Newark, Ohio, has acquired Molded Materials, Inc. According to President Furber Marshall, the new division will concentrate on the manufacture of truck brake lining and eventually will be expanded to include brake lining for passenger cars.

FURTHER DETAILS RELEASED ON NEXT DIVISION MEETING

As indicated in our previous issue, it has definitely been decided to hold the Spring Meeting of the Rubber Division, A.C.S., in New York City on Wednesday, Thursday and Friday, April 26, 27 and 28. The meeting will be held in the Hotel Commodore, as was the previous one. The decision to meet separately from the parent American Chemical Society was reached after a full review of the housing facilities in Cleveland where the 107th Meeting of the Society will be held the week of April 3.

An appeal for papers for presentation at the Spring Meeting has been issued by the Rubber Division. Papers may deal with any phase of the science and technology of natural or synthetic rubber. Those planning to present a paper must submit abstracts of 200 to 250 words, in triplicate, by February 25. The deadline for receipt of complete manuscripts, also in triplicate, is March 15. Both abstracts and complete papers must be sent to the secretary of the Division, H. I. Cramer, c/o Sharples Chemicals, Inc., 123 So. Broad St., Philadelphia 9, Penna. The abstract should be accompanied by information as to present connection, the laboratory in which the work reported was carried out, and an estimate of the time required for presentation of the paper.

The earlier-than-usual deadlines have been set to comply with the request of the Office of the Rubber Director that all paper be submitted for clearance six weeks prior to the date of the meeting. It should be kept in mind that at least one author of any paper by American chemists must be a member of the American Chemical Society.

The local committee in charge of arrangements for the Spring Meeting in New York is headed by Harry E. Outcault (St. Joseph Lead) as chairman, assisted by the following: Walter J. Geldard (Naugatuck Chemical), Fred Conover (Naugatuck Chemical), Joseph Breckley (Titanium Pigment), Simon Collier (Johns-Manville), M. F. Davis (Huber), E. S. Kern (Vanderbilt), Irving Lightbown (Stanco Distributors), Peter P. Pinto (RUBBER AGE), B. B. Wilson *(India Rubber World)*, and R. G. Seaman *(India Rubber World)*.

It has also been announced that the Divisional banquet, a feature of every meeting, will be held at the Commodore on Thursday evening, April 27.

Additional "E" Awards

Included among companies receiving the Army-Navy "E" burgee for production efficiency in recent weeks were the Masland Duraleather Co., Philadelphia, and Respro, Inc., Cranston, R. I. White stars, indicative of continued production efficiency, were awarded to the Akron plants of the B. F. Goodrich Co. and to the Toledo plant of the DeVilbiss Co.

PHYSICAL SOCIETY'S MEETING FEATURES RUBBER SYMPOSIUM

The Autumn Meeting of the American Physical Society, held at Northwestern University, Evanston, Ill., on November 12 and 13, featured a symposium on the physics of rubber and other high polymers. Of the 16 papers presented, the majority dealt with research and development problems having to do with rubber, either natural or synthetic.

H. M. James, of Purdue University, in a paper entitled "Present Status of Theory of Elasticity of Rubber," reviewed the kinetic theory and advanced and discussed the idea of an effective internal pressure, stating that vulcanization appeared to consist of the reinforcing of cross-links already present in raw rubber and the introduction of new cross-links.

L. A. Wood and F. L. Roth, of the National Bureau of Standards, presented a paper on "Stress Temperature Relations in Natural Rubber" in which it was pointed out that studies of stress-temperature relations at constant elongation in a pure gum vulcanizate of natural rubber in which Butyl Zimate was used for acceleration had yielded information used for calculations involved in the theory of elastic behavior and furnished practical data regarding tensile properties at different temperatures.

"GR-S, an Elastically Inverted Polymer" was the subject of a paper delivered by W. B. Wiegand and H. A. Braendle, of Columbian Carbon Co. It was brought out that at low elongations GR-S has a greater hysteresis than natural rubber and that at elongations approaching failure, the reverse is found. This, coupled with the high negative coefficient of tensile strength of GR-S and its high heat build-up at low elongations, was offered as an explanation of the rapid cut-growth failure of GR-S treads.

J. H. Dillon, I. B. Prettyman, and G. L. Hall, of Firestone Tire & Rubber Co., presented a paper on "Hysteretic and Elastic Properties of Rubber-Like Materials under Dynamic Shear Stresses" in which they reported on the nature of hysteresis in products such as pneumatic and solid tires and transmission belts.

Drift Tests Described

In a paper on "Drift and Relaxation of Rubber," M. Mooney, W. E. Wolstenholme, and D. S. Villars, of U. S. Rubber Co., referred to drift tests conducted over a period of eight years on rubber blocks in compression at 35° C. The rate of drift, initially high, attained a low constant value in 200 days or less, according to the paper, and was reduced still further when the increase in deformation due to drift altered appreciably the area of stress. The drift varied considerably with the type of accelerator in the compound and oxidation appeared a major factor in steady relaxation at elevated temperatures.

"Light Scattering in Solutions" was the subject of a paper presented by P. Debeye, of Cornell University, in which he reported conclusions drawn from the optical analysis of solutions of polymers. The discussion was divided into two parts, the first dealing with particles about 1/10 the wave length of primary light and the other with particles larger than the wave length.

In a paper on "Physical Methods of Analysis of Synthetic and Natural Rubber," R. Bowling Barnes, Van Zandt Williams, A. R. Davis, and Paul Giesecke, of American Cyanamid Co., showed how it was possible to determine quite accurately the percentage composition and type of rubbers, both natural and synthetic, by the use of colorimetric methods using visible light and by means of infra-red spectroscopy.

Studies of interest in connection with a precise evaluation of the "elastic memory" so much in evidence during forming operations were discussed by Howard A. Robinson, Ruth Ruggy, and Elizabeth Slantz, of Armstrong Cork Co. Their subject was "Some Physical Properties of Commercial Polymerized Methyl Methacrylate."

New Extrusion Plastometers

In a paper on "Rheological Properties of Natural and Synthetic Rubbers," R. H. Kelsey and J. H. Dillon, of Firestone Tire & Rubber Co., described an extrusion plastometer for rubber-like materials which measures the shearing stress at a predetermined constant average rate of shear and at a given temperature.

"A New Extrusion Plastometer" was the subject of a paper in which H. A. Schultz and R. C. Bryant, of the B. F. Goodrich Co., presented a discussion of a plastometer developed which, by use of special dies and a device to apply tension to the extruding sample, has been found to correlate well with factory tubing runs and to provide an excellent production control method for making synthetic rubber tread tubing.

Pointing out that the general trend of X-ray techniques had been on the same level for the last 15 to 20 years, I. Fankuchen and H. Mark, of Brooklyn Polytechnic Institute, in a paper on "Crystallization of Long-Chain Compounds," presented some results of an investigation of new techniques which they had recently applied to rubber-like and high polymeric materials. The use of low-angle scattering in high polymer research, a new method in this country, was described and its value in determining the size and shape of macromolecules pointed out.

Vulcanized rubber is composed of a cross-linked network of chain molecules, segments of which are sufficiently free and mobile in localized regions to form a crystal lattice upon stretching, declared S. D. Gehman and J. E. Field, of Goodyear Tire & Rubber Co., in their paper, "Observations on the X-Ray Structure of Rubber and the Size and Shape of Rubber Crystallites." The crystallites thus formed, according to the paper, represent an automatic molecular mechanism for reenforcement and are analogous to particles of reenforcing pigment which increase the modulus, strength, and tear resistance.

In a paper on "Stress Relaxation of Natural and Synthetic Rubber Stocks," A. V. Tobolsky, of Princeton University, and I. B. Prettyman and J. H. Dillon, of Firestone, disclosed that measurements of Hevea and Buna S stocks over a range of temperatures indicated complete stress decay in a time which became experimentally smaller with an increase in temperature and which was independent of elongation.

Paper on Hysteresis Losses

"Hysteresis Losses in High Polymers" was the subject of a paper presented by H. S. Sack, of Cornell, in which he described a method of examining the hysteresis of natural and synthetic rubbers by submitting them to vibrational forces at an elongation of 10% and determining the loss in energy resulting.

P. H. Emmett, of Johns Hopkins University, delivered a paper on "The Measurement of Surface Area of Carbon Black by Low Temperature Adsorption." The paper reviewed the development of this method which makes use of low-temperature adsorption isotherms of an inert gas measured near the boiling point of the gas and stressed the point that a knowledge of the surface area of carbon blacks should be helpful in many if not all of the uses to which carbon blacks are put.

A paper on "Second Order Transitions in High Polymers," presented by R. F. Boyer and R. S. Spencer, of Dow Chemical Co., was concerned with the thermal expansion of high polymers, especially as regards the break in the volume-temperature curve which defines the second order transition temperature.

Gerrard Company Changes Name

The Gerrard Company, Inc., 2915 W. 47th Street, Chicago, Ill., is now known as the Gerrard Steel Strapping Co., the better to identify the organization with the product it manufactures and distributes. The change in company name was effective January 1. For 25 years the Gerrard concern has manufactured steel strapping machines, both hand-operated and semi-automatic, for many different shipping uses.

Sharples in Larger Quarters

Sharples Chemicals, Inc., has moved its executive offices from 23rd and Westmoreland Streets to new and larger quarters located in the Fidelity-Philadelphia Trust Building, 123 S. Broad Street, Philadelphia 9, Penna. The change was effective January 1.

MARK DISCUSSES SYNTHETICS AT MONTREAL GROUP MEETING

A joint meeting of the Rubber and Plastics Division, Montreal Section, Society of Chemical Industry, and the Montreal Section itself, under the auspices of the Rubber Division, was held at the Ritz-Carlton Hotel in Montreal, Canada, on December 15. The meeting was preceded by a dinner attended by a number of students of McGill University who were guests of the British Rubber Co. of Canada. The featured speaker at the meeting was Dr. H. Mark, of the Brooklyn Polytechnic Institute, who spoke on "Some Scientific Aspects of the Synthetic Rubber Problem."

Dr. Mark discussed the structural features which are considered important for the thermal and mechanical behavior of high polymers, pointing out that the average degree of polymerization can be best determined by osmotic or ultracentrifuge measurements or by light scattering.

The distribution curve of molecular size can be obtained, according to Dr. Mark, by fractioning the polymer under consideration and by investigation of its fractions. All natural and synthetic polymers show more or less wide distribution curves, he said. In general, natural products such as cellulose or its derivatives exhibit somewhat sharper distribution curves than synthetic polymers or copolymers, such as vinyl derivatives or vinyl-butadiene combinations.

Discusses Molecular Arrangements

Intermolecular forces between the chain molecules depend upon the chemical nature of the monomer or monomers and upon their arrangement in the chains, the speaker stated, stressing the importance of the total average mutual attraction between the chain molecules, as well as the existence of very strong local bonds (so-called cross linkages). Strong over-all mutual attraction through hydrogen bridges or strong polar forces leads to typical fibers such as nylon, cellulose, cellulose esters and Saran, etc., he pointed out.

Moderate over-all attraction between the chain molecules, according to the speaker, leads to plastic materials which at sufficiently high temperature exhibit viscous flow and show the characteristics of a glass at low temperatures below the brittle point, *i.e.*, polystyrene, polyvinyl chloride, acetate copolymers, and polyacrylesters; weak over-all attractions, together with strictly localized strong cross-links, lead to typical rubbers. Such materials are amorphous or disordered in the unstretched state, Dr. Mark stated, but show definite crystallization under the influence of an external stress. However, above a certain temperature (transition point) the crystallized areas are only stable in the presence of a certain external force and as soon as this force ceases to act the crystals melt and the material contracts, showing rubber elasticity, he said.

The internal flexibility of the chain molecules depends also upon the chemical nature of the material, particularly upon whether there are any double or triple bonds left in the chains, the number and size of substituents which are attached to the main chain, and whether one has chains which are mainly straight or have a certain degree of branching, according to the speaker. It seems that high internal flexibility produces quick response to external forces, he said, while reduced molecular flexibility makes the material slow in respect to its response, and produces the phenomenon of creep and growth.

"Self-Starting" Airplane Tire

A "self-starting" airplane tire that will attain high rolling speed before it touches ground, thus easing the wear and tear of landing impact, has been announced by the B. F. Goodrich Co., Akron. The pre-landing rotation requires no motor, being achieved simply by a unique arrangement of vanes, or fins, built into the sidewall of the tire so that when the landing gear is lowered they catch the air and thus set the wheel spinning. The fins, made of rubber and fabric, are so constructed and placed that they spring back into position flush with the tire's side, on the "upper half" of each rotation of the wheel. The accompanying reproduction shows, left to right, W. H. Elliott, R. W. Hursh, and Henry Schippel, in whose name the patent is filed, examining the peculiar fins of the "self-starting" tire.

Hendricks to Speak at Chicago

The Chicago Group, Rubber Division, A.C.S., will hold its next meeting on Friday, February 4, in the Terrace Casino of the Morrison Hotel, Chicago, Ill. The technical speaker of the evening will be John G. Hendricks, of the Titanium Pigment Division of National Lead Co., who will speak on "The Use of Litharge in Synthetic Rubber Compounding." On the non-technical portion of the program a motion picture entitled "The Navy in Action" is to be shown through the courtesy of the U. S. Navy.

J. L. HAAS AND H. A. ATWATER HEAD BOSTON RUBBER GROUP

The meeting of the Boston Group, Rubber Division, A.C.S., held in the Hotel Statler, Boston, on December 10, and attended by approximately 190 members and guests, featured the election of officers for 1944, the presentation of a technical paper by Joseph M. Crosby, sales manager of the Thiokol Corp., and some unusual entertainment.

The following officers were selected: *Chairman,* Joseph L. Haas (Hodgman Rubber); *Vice-Chairman,* Harry A. Atwater (Hood Rubber); *Secretary-Treasurer,* J. R. Geenty (Reading Rubber); *Executive Committee,* L. R. Clarke (Haartz-Mason-Grower), the retiring chairman, and T. M. Knowland (Boston Woven Hose) and David R. Cutler, Jr. (Alfred Hale Rubber). The Nominating Committee was headed by Harold Fuller (Pequanoc Rubber), assisted by A. A. Glidden (Hood Rubber) and Jesse Mason (Haartz-Mason-Grower).

Selecting as his subject "Polysulfide Rubbers," Mr. Crosby described the several types of Thiokols available and outlined the best uses to which each particular type was suited. He emphasized the resistance of the Thiokols to numerous oils and solvents and dwelt at some length on the low temperature flexibility which features the latest type of polysulfide rubber introduced commercially. In conclusion, Mr. Crosby predicted that despite some encroachment which must be expected from the plastic materials, specialty synthetic rubbers have a brilliant post-war future.

Entertainment was furnished by a trio during dinner. Later, the members and guests were intrigued by the mind-reading act of Henry Gerald, the "Man with the X-Ray Eyes."

Fire Hose Advisory Committee

The formation of an Industry Advisory Committee for the Fire Hose Manufacturers Industry has been announced by the War Production Board, with Howard Frank as government presiding officer. Committee members are: H. F. Breesler (Goodyear), H. P. Schultz (Lee Rubber), Charles S. Cole (Fabric Fire Hose), Harry E. Smith (Manhattan Rubber), C. F. Conner (Goodrich), E. W. South (Hamilton Rubber), J. H. Hayden (Hewitt Rubber), W. F. Spoerl (U. S. Rubber), W. I. Lewis (Boston Woven Hose), R. S. Wharton (Quaker Rubber), and J. E. MacDonald, Jr. (Whitehead Bros. Rubber). An initial committee meeting has already been held.

Represents Hall in Canada

The C. P. Hall Co., Akron, Ohio, has announced the apointment of H. L. Blachford, Ltd., 977 Aqueduct St., Montreal, as Canadian agents for its wide line of products, including Para Flux, SPDX, and Stabilite. Para Flux stocks are now available from Toronto.

Named Technical Service Manager

Burt Wetherbee

Burt W. Wetherbee, who has been associated with the Globe Woven Belting Co., Buffalo, N. Y., since 1936 as manager of research, has joined the American Resinous Chemicals Corporation, Peabody, Mass., as technical service manager. The appointment is effective as of February 1. Mr. Wetherbee, who holds degrees from Tufts College and the University of Florida, has long been actively associated with the rubber industry and is widely known throughout the industry. He was one of the organizers of the Buffalo Rubber Group and served as chairman during the past year. In addition, he is a member of the American Chemical Society, the American Institute of Chemists, the American Association for the Advancement of Science, the Society of Automotive Engineers, and the Office for Production Research and Development. Mr. Wetherbee will probably maintain his headquarters in either Chicago or Detroit. An announcement to this effect will be made shortly.

Resumes Belting Manufacture

Production of rubberized belting for high speed machines, halted by war conditions, has been resumed on a full scale by the Russell Manufacturing Co., according to an announcement just issued by that concern. Russell officials state that synthetic rubber, now being used in the manufacture of the belting, is tougher than natural rubber and shows less deterioration from abrasion, oil, and grinding compounds. Such belting, they point out, must meet exacting tests, as some of it is used on industrial machines calling for 100,000 revolutions per minute. The Russell firm is also conducting tests of belting made from "trolenelized leather," a product it recently developed.

NORTHERN CALIFORNIA GROUP HOLDS FIRST CHRISTMAS PARTY

The Northern California Group, Rubber Division, A.C.S., held its first annual Christmas party at Dugan's Theatre Cafe, in Emeryville, Calif., on Monday, December 20. Approximately 60 guests attended. An entertainment program consisting of professional vaudeville acts, stunts presented by members, and motion pictures was enjoyed.

The following new officers for 1944 were introduced: *President*, Leonard Boller (Pioneer Rubber Mills); *Vice-President*, Russell D. Kettering (Oliver Tire & Rubber Co.); and *Secretary-Treasurer*, George B. Farwell (Reliance Rubber Co.). Herman Jordan, retiring president, was presented an appropriate gift in appreciation of his services. Drawing was held for a large number of gifts donated by the following firms:

American Rubber Mfg. Co., E. I. du Pont de Nemours & Co., Farrel-Birmingham Co., Goodyear Rubber Co., C. P. Hall Co., Hycar Chemical Co., Oliver Tire & Rubber Co., Oronite Chemical Co., Pacific Rubber & Tire Mfg. Co., Pioneer Rubber Mills, Plant Rubber & Asbestos Works, Reliance Rubber Co., H. M. Royal, Inc., and Shell Development Co.

A new bulletin on basketball covering important fundamentals on all types of plays has just been published by U. S. Rubber and is now available on request to the company at 1230 Sixth Avenue, New York City.

Turner with General Magnesite

Robert F. Turner

Robert F. Turner was recently named sales manager of the General Magnesite & Magnesia Co., of Philadelphia, manufacturers of high quality magnesia products, including extra light oxide of magnesia for compounding neoprene and other products. General Magnesite is now under new management. Ralph E. DeTurk is plant manager.

Stauffer Heads American Anode

B. F. Stauffer

B. F. Stauffer, identified with the B. F. Goodrich Co. for the past 50 years, was elected president and general manager of American Anode, Inc., at the annual meeting of the Akron company held recently. He assumed his new duties January 1. Mr. Stauffer succeeds Raymond W. Albright, general manager of American Anode since 1926, who has been named vice-president and general manager of Distillation Products, Inc., of Rochester, N. Y. Joining Goodrich in 1893 in the bicycle tire department, Mr. Stauffer has served the company in various production and sales capacities and was assistant general manager of the industrial products sales division at the time of his selection to head American Anode.

Rubber Replaced in Binoculars

By developing techniques for applying a Vinylite cover instead of the sheet rubber cover previously used, engineers of the Westinghouse Electric & Manufacturing Co. are saving approximately 30,000 pounds of rubber annually in the manufacture of binoculars for the Army, it is announced. According to the company, the combined efforts of Westinghouse and the Army Ordnance Department produced the plastic covering, which is said to be indistinguishable from the rubber covering.

Passenger car tires made of synthetic rubber are doing a good job under wartime driving conditions, according to U. S. Rubber Co. field engineers. The engineers report that, when driven at wartime speeds, the synthetics are giving 90% or better of the tread wear obtained from first line rubber tires. Interesting variations in tire mileage have been found to exist in different sections of the country, due to topography, climatic conditions, and types of road surfaces.

CONOVER AND OUTCAULT HEAD N. Y. RUBBER GROUP

Fred S. Conover, of the Naugatuck Chemical Division of U. S. Rubber Co., and Harry E. Outcault, of the St. Joseph Lead Co., were elected chairman and vice-chairman, respectively, of the New York Group, Rubber Division, A.C.S., at the Annual Christmas Party and Meeting of the Group, held at the Building Trades Club in New York City on December 17. Attendance at the meeting exceeded 450, with the result that aproximately 50 members and guests had their dinners at the neighboring Hotel Vanderbilt, returning to the club for the program which followed dinner.

Other officers for 1944 elected at the meeting included Ervin S. Kern, of the R. T. Vanderbilt Co., as sergeant-at-arms, and Peter P. Pinto, of RUBBER AGE, as secretary-treasurer. Harry L. Fisher (U. S. Industrial Chemicals), S. M. Martin, Jr. (Thiokol), and Harry Frecker (U. S. Rubber) were elected directors for three-year terms. John H. Ingmanson (Whitney Blake), the retiring chairman, and B. B. Wilson *(India Rubber World)* become ex-officio members of the board. The Nominating Committee consisted of John deC. Van Etten (Vansul) as chairman, and K. B. Cary (Vanderbilt) and S. Collier (Johns-Manville).

As usual, the evening was devoid of any technical program, with entertainment being furnished before and after dinner. Approximately 210 prizes were distributed to holders of lucky number tickets, these prizes being made possible by generous donations received from the following concerns:

Advance Solvents & Chemical Corp.; Akron Standard Mold Co.; L. Albert & Son; American Cyanamid & Chemical Corp.; American Zinc Sales Co.; Anaconda Sales Co. (Pigment Division); J. T. Baker Chemical Co.; The Barrett Division, Allied Chemical & Dye Corp.; Binney & Smith Co.; Godfrey L. Cabot, Inc.; Callaway Mills; Carter Bell Mfg. Co.; Cleveland Liner & Mfg. Co.; The Container Co.; Continental Carbon Co.; E. I. du Pont de Nemours & Co., Inc. (Rubber Chemicals Division); Flintkote Co.; General Atlas Carbon Division of General Properties Co., Inc.; Givaudan-Delawanna, Inc.; The C. P. Hall Co.; J. M. Huber, Inc.; D. E. Henderson (Hycar Chemical Co.); R. C. Bascom (Hycar Chemical Co.); *India Rubber World;* I. B. Kleinert Rubber Co.; The Lowenthal Co.; Midwest Rubber Reclaiming Co.; Monsanto Chemical Co. (Rubber Service Department); Moore & Munger; H. Muehlstein & Co., Inc.

National Rubber Machinery Co.; National Sherardizing & Machine Co.; Naugatuck Chemical Division of United States Rubber Co.; New Jersey Zinc Co.; Pequanoc Rubber Co.; The Philadelphia Rubber Works Co.; Pittsburgh Plate Glass Co. (Columbia Chemical Division); Rare Metal Products Co.; Revertex Corp. of America; RUBBER AGE; St. Joseph Lead Co.; A. Schrader's Son; A. Schulman, Inc.; Henry L. Scott Co.; Southeastern Clay Co.; Speed Products Co.; Stamford Rubber Supply Co.; Stanco Distributors, Inc.; Standard Chemical Co.; Stauffer Chemical Co.; Sun Oil Co.; C. J. Tagliabue Mfg. Co.; Textile Proofers, Inc.; Thiokol Corp.; Thompson, Weinman & Co., Inc.; Wm. R. Thropp & Sons Co.; Titanium Pigment Corp.; United Carbon Co.; U. S. Rubber Reclaiming Co.; R. T. Vanderbilt Co., Inc.; Vansul, Inc.; C. K. Williams & Co.; Wilmington Chemical Corp.; Wishnick-Tumpeer, Inc.; Xylos Rubber Co.

Retake Rubber Ground

According to a special report to the *New York Times*, the recent capture of Saidor in New Guinea by American troops marks the first time that the Allies have retaken any rubber-producing land from the Japanese. Approximately 300 acres of rubber trees are located in Saidor. As the report points out, while the rubber tree area is relatively small, the event is perhaps symbolic.

BUFFALO GROUP SELECTS CASSELL AND VAN NIMWEGEN

G. W. Cassell, of the General Cable Corp., and G. Van Nimwegen, of the Carborundum Co., were elected chairman and vice-chairman of the Buffalo Group, Rubber Division, A.C.S., at the annual Christmas Party and Meeting of that group held in Buffalo on December 16. H. J. Deney, of Pierce & Stevens, Inc., was named secretary-treasurer. Approximately 110 members and guests attended the meeting.

Other than the election of officers, the entire evening was devoted to dinner, entertainment and the presentation of prizes to holders of lucky number tickets. A large group of prizes was distributed, made possible by generous donations received from the various suppliers of materials and equipment to the industry.

Named Hycar Vice-President

W. S. Richardson, general manager of the chemicals division of the B. F. Goodrich Co., has been elected vice-president of the Hycar Chemical Co., owned jointly by Goodrich and the Phillips Petroleum Co. He succeeds R. W. Albright, who recently resigned to become vice-president and general manager of Distillation Products, Inc., Rochester, N. Y. Mr. Richardson entered the rubber industry in 1914 and joined Goodrich in 1926 on the staff of the works manager. He was made general manager of the industrial products sales division in 1942 and became head of the chemical division in mid-1943.

DETROIT GROUP'S CHRISTMAS CELEBRATION WELL ATTENDED

The Detroit Rubber and Plastics Group held its Christmas get-together and dinner on Wednesday, December 15, at the Detroit-Leland Hotel, Detroit, Mich. Approximately 150 members and guests heard an address by H. G. Moock, of the Chrysler Corporation, and watched Walter Grote, of the United Carbon Co., perform a few of his celebrated card manipulations. As a concluding feature, about 25 prizes, contributed by various manufacturers catering to the rubber and plastics industry, were distributed.

Speaking on the subject, "Some Viewpoints on Leadership," Mr. Moock emphasized that, regardless of their job titles, all in his audience were salesmen with the sales job of transferring ideas from their own minds to other minds. He stressed the point that the success of the transfer is conditioned on due consideration being given to the individual viewpoints, prejudices, and capacities of the man who is to receive the idea.

Of general interest to the members was a report made by Professor C. W. Selheimer on the progress of the rubber and plastics laboratory at Wayne University, Detroit. This laboratory has been a major interest of the Detroit Group and the equipment or cash received up to a value of about $16,000 as reported by Dr. Selheimer represents approximately one-third accomplishment of the goal as set two years ago.

The equipment has been housed in the Department of Chemical Engineering at the University and in February the course in chemistry of rubber and plastics will become a part of the regular chemical engineering curriculum.

Calco Buys United Color Co.

Purchase from the Interchemical Corporation of its United Color and Pigment Company division, located in Newark, N. J., has been announced by the Calco Chemical Division of the American Cyanamid Co. United Color is a major factor in the production of organic and inorganic chemical colors. According to the Calco statement, the new unit will be known as the United Color and Pigment Department of the Calco Chemical Division. No change of management, personnel or policies is contemplated.

New Plant for Goodrich

Establishment of a new production unit for the manufacture of certain mechanical rubber goods at DuBois, Penna., has been announced by the B. F. Goodrich Co. Operations at the new plant are expected to get under way shortly. A. J. Baker, who has been acting as manager of factory employment at Akron, will head up the new plant as manager. Goodrich recently announced the construction of a new tire plant at Miami, Oklahoma.

CHICAGO GROUP'S XMAS PARTY DRAWS ATTENDANCE OF 400

The Annual Christmas Party of the Chicago Group, Rubber Division, A.C.S., held in the Terrace Casino of the Morrison Hotel, Chicago, Ill., proved a most enjoyable evening of fun and frolic for the members, their wives, and guests, numbering approximately 400, who attended. The two-hour floor show which followed an excellent dinner was pronounced one of the best in the annals of the organization, and dancing was enjoyed until a late hour.

James Sheridan (N. J. Zinc) and H. A. Winkelmann (Dryden Rubber Co.) were co-chairmen of the committee in charge, and were ably assisted by Parker Highsmith (Bibb Mfg. Co.), Mel Vaughn (Wishnick-Tumpeer), and W. F. Bernstein. The success of the party was made possible by contributions received from the following companies:

Advance Solvents & Chemical Corp., Airlastic Rubber Co., L. Albert & Son, American Container Corp., American Resinous Chemicals Corp., American Roller Co., American Zinc Sales Co., Anchor Rubber Mfg. Co., Anderson-Bolling Mfg. Co., Auburn Rubber Corp., Barrett Co., Bibb Mfg. Co., Binney & Smith Co., Samuel Bingham's Son Mfg. Co., Brown Rubber Co., Carter Bell Mfg. Co., Chicago Belting Co., Chicago Cutting Die Co., Chicago Rubber Clothing Co., Cleveland Liner & Mfg. Co., E. W. Colledge, Commerce Petroleum Co., Continental Carbon Co., Cupples Co., Darling & Co., T. A. Desmond & Co., Diamond Wire & Cable Co., Dryden Rubber Co., E. I. du Pont de Nemours & Co., Eagle-Picher Sales Co., E. & B. Enterprises, Farrel-Birmingham Co., Frost Rubber Works, General Atlas Carbon, Genseke Bros., General Latex & Chemical Corp., Godfrey L. Cabot, Inc., R. W. Greef Co.

C. P. Hall & Co., Herron & Meyer, Hub Plating Works, J. M. Huber, Inc., Hycar Chemical Co., Ideal Roller Mfg. Co., *India Rubber World*, Industrial Rubber Goods Co., Inland Rubber Corp., Douglas P. Johnstone, Judsen Rubber Works, Keystone Plating Works, Kraft Chemical Co., La Jone Rubber & Mfg. Co., Lonergan Die Co., Magie Bros., Marbon Corp., Midwest Rubber Reclaiming Co., Monsanto Chemical Co., Moore & Munger, H. Muehlstein & Co., National Rubber Machinery Co., National Smelting & Refining Co., National Standard Co., Naugatuck Chemical, New Jersey Zinc Sales Co., Pequanoc Rubber Co., Philadelphia Rubber Works, Pittsburgh Plate Glass Co., Palmer Asbestos & Rubber Corp., Rapid Roller Co., Rex-Hide, Inc., RUBBER AGE.

Stamford Rubber Supply Co., A. Schulman, Inc., Sherwin-Williams Co., Stanco Distributors, Standard Chemical Co., Stauffer Chemical Co., Titanium Pigment Corp., Thiokol Corp., United Carbon Co., U. S. Rubber Reclaiming Co., Van Cleef Bros., R. T. Vanderbilt Co., Warwick Chemical Co., Wear Proof Mat Co., Western Felt Works, Williams-Bowman Rubber Co., Wilmington Chemical Corp., Wishnick-Tumpeer, Inc., and Xylos Rubber Co.

Back Copies Wanted

C. W. Christensen, treasurer of the Rubber Division, A.C.S., is anxious to secure back copies of various issues of *Rubber Chemistry & Technology*, as well as several complete sets of this journal. Prices for the individual back copies desired range from $1.00 to $5.00 per copy, while special payments will be arranged for complete sets. Back copies desired include the following: April, 1928; January and April, 1929; January and April, 1930; July and October, 1936; January, 1937; January and July, 1938; January, April, July and October, 1939; January and October, 1940; and January, 1943. All correspondence concerning back issues or complete sets should be sent to C. W. Christensen, c/o Monsanto Chemical Co., 1012 Second National Bldg., Akron, Ohio.

Goodyear Sponsors New Radio Show

Goodyear Tire & Rubber Co. is now sponsoring, over 125 NBC stations from coast-to-coast, a Saturday morning radio show entitled "Hook'n Ladder Follies." Aired at 11 A.M., E.W.T., and at the corresponding hours across the country, the program features music and comedy, the cast including Ralph Dumke, Frank Novak, the Song Spinners, and other popular radio artists. The new Goodyear show is in addition to the well known "Salute to Youth" program which the NBC network carries for the company on Tuesday evenings.

Akron Meets on February 4

The next meeting of the Akron Group, Rubber Division, A.C.S., will be held on Friday, February 4, at the Portage Hotel in Akron. Lynn H. Holcomb, news editor of the *Akron Beacon Journal*, will speak on "Newspapers and the War."

Holfast Rubber Co., of Atlanta, Ga., is preparing to manufacture a cork-like material made from peanut hulls under a patent held by Herman Kulman, of Atlanta, who, after considerable experimenting, believes he has a satisfactory cork substitute. According to Holfast, company plans involve government contracts. A number of large soft drink manufacturers are said to have tested and approved Kulman cork crown liners.

GATES RUBBER CLUB RESUMES ACTIVE MEETING SCHEDULE

Following a summer recess, the Gates Technical Club, Denver, Colorado, resumed its regular meetings in September and held three up to the turn of the year.

On September 20, C. H. Mingle, technical director of the Gates Rubber Co., discussed long range plans and policies of the company in regard to future development and expansion before 98 members and associate members assembled for dinner in the Oxford Hotel in Denver.

At a meeting held on November 1, Ed Cunningham, of Stanco Distributors, Inc., addressed the club on "The Development and Interpretation of Physical Tests in the Rubber Industry." He was accompanied by Jack Britton, of Stanco, and a spirited discussion followed his talk during which many interesting points were brought up.

Results of an election of officers were announced at the November meeting, as follows: William Reichardt, *president;* Wesley Merritt, *vice-president;* Carl Mullen, *treasurer;* Franklin French, *secretary;* and Ray Cooper, *sergeant-at-arms.* Douglas Chalmers, the retiring president, was made an ex-officio member of the board.

A dinner meeting of the club was held on December 13 in the Oxford Hotel and was attended by 75 members and guests. Claude Hathaway, of the Hathaway Instrument Co., Denver, addressed the organization on this occasion and told the story behind the precision instruments the Hathaway concern manufactures. One specialized instrument Hathaway makes can measure accurately 5/100,000,000ths of an inch, according to the speaker, and the oscillograph, another highly sensitive electronic device, measures the strain in a piece of metal under load by utilizing the minute electric currents generated in a metal under strain.

In one instance mentioned by Mr. Hathaway, an oscillograph was used to determine the strain in a certain railway bridge, which was a bottleneck in war freight movements. The measurements allowed the engineers to determine accurately the safe load and train speed for the bridge and traffic was speeded up to such an extent that plans for a supplementary bridge were abandoned.

Woburn Degreasing Changes Name

To conform more closely with the present nature of its business, the name of Woburn Degreasing Co. of N. J. has been changed to Woburn Chemical Corporation (N. J.). The change of name follows 15 years during which the emphasis of the concern's operations has shifted largely to heavy production of specification fatty acids and synthetic drying oils, Woburn now being a leading producer of organic chemicals.

NAMES IN THE NEWS

DR. CARL SHIPP MARVEL, professor of organic chemistry at the University of Illinois, who recently received the William H. Nichols Medal from the New York Section of the American Chemical Society, has been elected president of the A.C.S. for 1945. He took office as president-elect on January 1.

M. REA PAUL, who headed the recently-disbanded Specialty Rubbers Branch of the Office of the Rubber Director, is now associated with the Smaller War Plants Corp., where he is coordinating all aspects of the protective and technical coatings industry.

HERBERT E. SMITH, president of the U. S. Rubber Co., has accepted the chairmanship of the Rubber Division of the War Finance Committee for New York State for the Fourth War Loan.

JOHN A. SEUBERT, vice-president of the Pennsylvania Rubber Co., Jeannette, Pa., has been made president of the Eisemann Corp., Brooklyn, N. Y., manufacturers of magnetos, fuel injection systems, and similar electrical products.

SAM S. WERTHEIMER, associated with the Corona Insulated Wire Co. for the past several years as factory manager, has left that organization and is now affiliated with the White Electric Co., Inc., Haverstraw, N. Y.

P. J. RYAN, associated with Reichhold Chemicals, Inc., since 1936, most recently in the capacity of production manager, has been made a vice-president of that company. He will be in charge of the company's Detroit plant.

L. E. ROHRBAUGH, associated with the B. F. Goodrich Co. since 1918, has been appointed manager of the company's shoe products sales, succeeding FRED A. LANG, recently named division merchandise manager. He will have charge of the sale of soles and heels, as well as other rubber and plastic products used by the shoe industry.

GORDON GROTH, who has been serving as contact engineer in the structural and plate division of the Carnegie-Illinois Steel Corp., has joined the Pennsylvania Rubber Co., Jeannette, Pa., as assistant to HOWARD W. JORDAN, president.

JOHN KARRH, who has been actively engaged in the production and sale of chemicals for the past fifteen years, has been named plant manager of the new butadiene plant of the Publicker Commercial Alcohol Co., Philadelphia. He joined the company a few months ago.

ATHERTON LEE, who has been chief of the Natural Rubber Section of the Office of the Rubber Director for the past year, and who has been in charge of the work of reviewing and evaluating programs for getting natural rubber into production, has resigned from government service to enter private industry.

WALTER E. HARVEY, vice-president of the Thermoid Co., has been elected a vice-president of the Joseph Stokes Rubber Co., Trenton, N. J., while R. H. TEMPLE, secretary-treasurer of Thermoid, has been elected secretary of Stokes. Thermoid recently acquired complete stock interest in the Stokes concern.

WILLIAM E. TAYLOR, formerly production manager of the Firestone Rubber & Latex Products Corp., is now general manager of the Zenith Plastics Co., Cleveland. He is also conducting evening courses in plastics at the Cleveland branch of the Plastics Industry Technical Institute.

HARVEY S. FIRESTONE, JR., president of the Firestone Tire & Rubber Co., and JOHN L. COLLYER, president of the B. F. Goodrich Co., have been elected directors of the National Association of Manufacturers.

G. F. HICHBORN, who has spent 52 years of active service in the transportation field, most recently as director of traffic for the U. S. Rubber Co., has retired from active business. His retirement was marked by a luncheon given by his New York associates.

MARVIN L. DAVIS, chief civil engineer of the Firestone Tire & Rubber Co., has been selected as service director of Akron by newly-elected MAYOR CHARLES E. SLUSSER. He was formerly a member of the city civil service commission.

JOHN J. DONAHUE, production superintendent of the fuel cell department of U. S. Rubber Co. at Detroit, has been transferred to the company's Fisk tire plant at Chicopee Falls, Mass., where he will be superintendent in charge of tire production.

WILLIAM A. HENSLEY, formerly chief inspector at the West Virginia Ordnance Works, has joined the Xylos Rubber Co., Akron, as a research organic chemist. He is assigned to the laboratory staff.

Doering Joins Vanderbilt

J. Harvey Doering

J. Harvey Doering, well-known rubber chemist of the Ford Motor Co., has resigned from that company and has joined the R. T. Vanderbilt Co., as of January 1. Mr. Doering will specialize in tire and tube compounding service for Vanderbilt materials. He will work out of the New York office, spending most of his time in Akron with frequent trips to the company's laboratory in East Norwalk, Conn. He will make his residence in Akron. J. C. "Woody" Wood, the present representative in the Ohio territory for Vanderbilt, will continue covering rubber manufacturers in that area as heretofore.

Mr. Doering was born in Philadelphia in October, 1891, and received his B.S. in chemistry from the University of Pennsylvania in 1913. After spending a few years with the D. B. Martin Co., manufacturers of fats, oils and fertilizers, and with the explosives division of DuPont, he joined the Firestone Tire & Rubber Co. in 1918, remaining with that company until 1937. At Firestone, he did compounding and research work on tires, tubes and mechanical goods for six years, then spent one year in the reclaiming plant, and five years in charge of research and compounding in Plant Two.

In 1937 Mr. Doering joined Ford shortly after that company started its tire plant. He was placed in charge of the rubber laboratory and did extensive development work on tires, tubes and automotive rubber and, more recently, on plastics. After Ford sold its tire plant to the Soviet Union under Lend-Lease arrangements, Mr. Doering remained in charge of the rubber laboratory until he left to join the Vanderbilt Company.

Aetna Rubber Co., of Cleveland, has reopened its plant at Ashtabula, Ohio. Frank S. O'Malley is the superintendent.

CANADIAN NEWS

Stating that the rubber industry of Canada is of considerable importance in the industrial life of the country, the General Manufactures Branch of the Dominion Bureau of Statistics has issued a review of the industry in Canada in 1942. According to the review, Canada now ranks among the leading countries of the world as a manufacturer of rubber goods. Normally it is the sixth largest importer of raw rubber in the world, ranking after the United States, the United Kingdom, Japan, Germany, and France.

Establishments manufacturing rubber tires, rubber footwear, and other rubber goods numbered 42 in 1942, the review states, 29 plants being located in Ontario, 18 in Quebec, one in Saskatchewan, and one in British Columbia. These plants had capital investment of $74,464,827, furnished employment to 15,497 persons who received $23,413,150 in salaries and wages, and produced goods valued at $122,231,402 from materials costing $61,576,546.

The review points out that the industry is practically confined to the provinces of Ontario and Quebec. The plants in Ontario employed over 82% of the capital, over 70% of the persons engaged in the industry, and produced over 81% of the entire output. It is further stated that the rubber industry also forms an adjunct of considerable importance to the cotton yarn and cloth industry, which supplies it with fabrics, and that, besides supplying the domestic market, the industry contributes materially to the export trade of Canada.

The value of production in 1942, according to the review, was $3,093,626 higher than in the previous year. There was an increase in the selling value of tires and inner tubes produced, the value of production rising from $64,030,626 in 1941 to $66,831,055 in 1942. The volume of footwear decreased from 17,062,961 pairs in 1941 to 14,768,965 pairs in 1942 and the value decreased from $21,844,601 to $19,858,565. The miscellaneous section of the rubber industry, which includes such products as rubber heels and soles, rubber belting, hose, medical and druggists' supplies, mechanical rubber goods, etc., increased its production from $33,262,549 in 1941 to $35,541,782 in 1942. For the rubber industry as a whole, there was thus an increase of $3,093,626 in the value of production. There was also an increase of $2,236,225 in the cost of materials used and an increase of $620,774 in the amount of salaries and wages paid.

Of the three main classes of products manufactured in the Canadian rubber industry in 1942, the review points out, rubber tires and tubes accounted for $66,831,055 or almost 55% of the total, rubber footwear for $19,858,565 or over 16%, and other rubber goods for the balance of $35,541,782 or over 29%. Compared with the previous year the output of rubber tires and tubes increased in value by $1,986,036 or over 9% and other rubber goods increased by $2,279,233 or almost 7%.

Prospects for the rubber industry in Canada in 1944 were viewed optimistically in a New Year's statement by James I. Simpson, president of the Rubber Association of Canada, who also is president of the Dunlop Tire & Rubber Goods Co., Toronto.

"Besides meeting all demands for war requirements, there is now every indication that a considerably greater quantity of tires will be available for essential transportation in 1944 than was the case in 1943," Mr. Simpson stated. "It would, therefore, appear," he said, "that the volume of production by the rubber industry in 1944 will be at least equal to and quite possibly greater than in 1943."

Prospects for the post-war period are equally encouraging, according to Mr. Simpson. Due to the curtailment during the past two years of rubber products other than those considered absolutely esesntial, he predicted that there will be a very substantial backlog to be taken care of and that this will be further augmented when the automobile manufacturers can again turn their production from war to civilian requirements.

"The outstanding achievement in the rubber industry during 1943," Mr. Simpson noted, "was the fact that sufficient rubber was still available to meet all the demands of the armed forces, keep the wheels of industry turning, and supply the needs of essential transportation. After being cut off from rubber supplies for almost two years, this is no mean accomplishment and reflects the very outstanding job which has been done by the rubber controller and his staff. Equally commendable," he said, "has been the work of the Polymer Corporation, under the direction of the Department of Munitions and Supply, in bringing the synthetic rubber plant in Canada into production in the very limited time which was available."

R. C. Berkinshaw, president of the government-owned Polymer Corporation, Sarnia, Ont., stated in Toronto on December 8 that there will be a dearth of tires for the next 18 months to two years but that during that period there should be a steady improvement in tire availability. Mr. Berkinshaw addressed the 17th annual meeting of the Automotive Transport Association of Ontario. "The public today is keenly rubber conscious," he said, "but it is not yet as tire-care conscious as it should or will have to be. This change will have to be brought about quickly or the synthetic rubber now going on wheels will fail to give anything like its full mileage possibilities."

A plan providing for retirement on pension of all employees of the Dominion Rubber Co. reaching the age of 65 who have rendered 25 or more years of service was announced by Paul C. Jones, president, in an address before 202 members of the long-service group at an annual dinner in the Mount Royal Hotel, Montreal, on December 14. Special provision is made in the plan for employees who, through physical disability, are prevented from serving to the prescribed age.

Dunlop Tire & Rubber Goods Company declared a dividend of 2½% on the 5% cumulative redeemable first preference shares for the half-year ended December 31 to shareholders of record December 15. A dividend of fifty cents per share on common stock for the year 1943, payable December 21 to shareholders of record December 15, also was declared.

The Department of Munitions and Supply has released quantities of neoprene and it is reported that textile webbing and braids, utilizing synthetic rubber of the neoprene type, will be in production in Canadian mills shortly. Due to difficulties in providing required types of rubber threads, problems in manufacture, etc., textiles containing synthetic rubber will not be available to the retail trade for some months, it is stated. Neoprene will be used by Dunlop Tire & Rubber Goods Co. to produce cut rubber threads in a form suitable for use by the trade and it will be used by Canadian Lastex, Ltd., a subsidiary of Dominion Rubber Co., to produce certain types of Lastex yarns, according to the report. Neoprene is much higher than the price of natural rubber used during the basic price ceiling period and arrangements for subsidies have been completed.

Establish Central Laboratory

The establishment of a Central Research Laboratory near Wilmington, Delaware, to allow for necessary extension of research programs vital to the war effort and to relieve the crowded conditions of present facilities, has been announced by the Atlas Powder Co. R. S. Rose, Jr., present director of the company's laboratory at Reynolds, Penna., will head up the new Central Laboratory, the first unit of which is near completion. Fundamentally, according to Dr. K. R. Brown, Atlas director of research, the research to be conducted at the new laboratory lies in the development of organic compounds for industrial applications.

FINANCIAL NEWS

SEIBERLING REPORT REVEALS NET PROFIT OF $609,301

A net income of $609,301 after Federal taxes, based on net sales of $18,273,782, was reported for Seiberling Rubber Co. on December 27. The 1943 figures showed a 16.8% decrease in net profits in the face of the largest net sales in the company's history—a 56% increase over 1942—because of mounting taxes.

Total current assets of $5,381,847 compared with liabilities of $1,508,225, a ratio of 3½ to 1. The assets included $100,000 in United States savings bonds. Provision has been made for $1,411,000 to cover Federal taxes, it was pointed out.

Discussing the future outlook for the company and for the rubber industry, Mr. Seiberling predicted it would take from three to five years after the war to re-equip the nation's cars and trucks with new tires and to rebuild inventories.

Mr. Seiberling reported that during the fiscal year cash dividends totaling $282,910 were paid, equivalent to $2.50 per share on prior preference stock, $5 on Class A preferred stock, 84 cents on the now retired Class B preferred stock, and 50 cents per share on common. The report showed net profit after Federal taxes in 1939 on $9,328,467 of net sales was $823,791, while net profit in 1943 on approximately twice the 1939 sales was $609,301.

FIRESTONE TIRE & RUBBER REPORTS NET OF $15,183,382

Firestone Tire & Rubber Co. reports net profit of $15,183,382 for the fiscal year ended October 31, 1943, after provision of $12,409,015 for depreciation and $51,957,601 for taxes, and reserve of $3,000,000 for contingencies. This is equal to $6.40 a share of common stock and compares with $12,481,130, or $5.04 a common share, reported in the previous fiscal year. Sales amounted to $545,389,601, 55% above the $352,693,500 reported in 1942.

The consolidated balance sheet as of October 31, 1943, shows current assets of $181,327,269 against current liabilities of $73,606,550, which compares with $146,601,536 and $54,408,643, respectively, at the end of the previous fiscal year. Cash increased to $24,511,307 from $13,185,423, and inventories to $93,766,250 from $85,725,659 a year earlier.

Pharis Tire & Rubber Co.

Year Ended October 31: Net income of $209,992, or 95 cents a share, which compares with $119,027, or 54 cents a share, for the previous fiscal year.

Armstrong Rubber Co.

Year Ended September 30: Net income of $451,582, after provisions of $314,772 for Federal income taxes and $142,274 for depreciation, which is equal to $5.96 per share on the stock outstanding and which compares with net income of $380,558 reported for the previous fiscal year after provision of $198,256 for taxes. Net income from normal operations before deductions amounted to $832,702. In addition to the deductions noted, there has also been set aside $101,538 to establish a pension plan for the benefit of employees. The company has no funded debt.

Lee Rubber & Tire Corp.

Year Ended October 31: Net income of $1,241,934, after provision of $2,583,697 for Federal taxes and reserve of $250,000 for contingencies. The 1943 profit, which is subject to renegotiation, is equal to $5.14 each on 241,509 capital shares, and compares with $1,144,765, or $4.74 a share, after $1,061,264 taxes and $150,000 contingency reserve, reported for the previous fiscal year. Renegotiation proceedings for 1942 were completed and no refund was required. Net sales increased from $18,725,101 in 1942 to $25,236,489 in 1943, a gain of 35%.

Norwalk Tire & Rubber Co.

Year Ended September 30: Net profit of $162,165, or 65 cents a common share, subject to renegotiation and after $363,800 Federal taxes, which compares with $142,350 or 55 cents a share of common stock, after $288,000 taxes, for the previous fiscal year.

Status of Chlorinated Rubber

The present status of chlorinated rubber was recently outlined in a statement by E. G. Crum, manager of the Parlin, N. J., plant of the Hercules Powder Co. According to Mr. Crum, swift conversion of equipment from the production of Parlin, Hercules' name for its chlorinated rubber, to chlorinated paraffin shortly after Pearl Harbor averted a critical shortage of flame-proofing chemicals for tents, tarpaulins, and other textiles. Some amounts of chlorinated rubber are still being produced for special war uses, Mr. Crum revealed, and resumption of production after the war is planned. Prior to the conversion, the Parlin plant had a capacity of approximately 4,000,000 pounds of chlorinated rubber annually.

Joins Wilmington Chemical

H. Walter Grote

H. Walter Grote, associated with the United Carbon Co., Inc., of Charleston, W. Va., as technical representative and supervisor of laboratories since 1932, has resigned to join the Wilmington Chemical Corporation, 10 East 40th St., New York City, as technical sales representative. He will service the middle west from offices to be opened shortly in Akron. Prior to joining United Carbon, Mr. Grote was connected with the Murray Rubber Co., Trenton, the Ten Broeck Tyre Co., Louisville, and the U. S. Rubber Co., Detroit.

Chemical Cartel Charged

Suit was entered in the Federal Court in New York City on January 7 by the Department of Justice accusing four chemical corporations and five individuals of operating an international cartel system. The concerns named were Imperial Chemical Industries, Ltd., of London, Imperial Chemical Industries (New York), Ltd., E. I. du Pont de Nemours & Co., Inc., and the Remington Arms Co., Inc. The action alleged that since some time before 1920 there had been agreements among some of the defendants, and since 1933 all of them had been united on a division of world markets in the chemical industry.

National Safety Council's industrial engineering division activities have been reorganized to provide more practical and specific assistance with accident and health problems in industry. The new plan, which is in line with a general reorganization of the council's program, makes full use of the industrial membership sections as centers for the accumulation and distribution of all safety information in their respective fields. Floyd Van Atta is the division engineer in charge of the rubber, chemical, and refrigeration industries section.

OBITUARIES

John S. Richards

John S. Richards, director of research of the American Steel & Wire Co., died suddenly at his home in Cleveland, Ohio, on December 23. Born in McKeesport, Penna., in 1894, Mr. Richards was 49 years of age. He was a graduate of Carnegie Institute of Technology, where he studied chemistry, engineering, and metallography. Following connections with the National Tube Co. and the Carnegie Steel Co., he was made chief chemist of the Donora (Penna.) Works of American Steel & Wire Co. in 1928 and in 1934 was transferred to Cleveland as a metallurgist in the company's main offices. In March, 1942, he was appointed director of research. Mr. Richards was a member of the American Society for Metals, the A.S.T.M., the A.C.S., and the Institute of Metals, and was active on many of the committees of the American Iron & Steel Institute. He was a 32nd degree Mason and a member of the Cleveland Chamber of Commerce. Surviving are his widow, a daughter, and a son.

Edward J. Hugelet

Edward J. Hugelet, former general superintendent of Plant 2 of the Goodyear Tire & Rubber Co., Akron, died on January 1 of a heart attack in the home of his sister-in-law in Detroit, Mich. Mr. Hugelet was 65 years of age. A native of Wayne County, Ohio, he moved to Akron with his family as a youth. He started to work at the B. F. Goodrich plant and worked at the old Diamond Rubber Co., the shops of the Whitman & Barnes Co., and the India Rubber Co. He joined the Goodyear organization in 1903 and became supervisor, night foreman, general foreman, and assistant superintendent. In 1916 he was made general superintendent of Plant 2 on its opening. Mr. Hugelet was a Mason.

K. C. Benn

Kit C. Benn, master mechanic and one of the original employees of the Mohawk Rubber Co., died in City Hospital, Akron, Ohio, a victim of bronchial pneumonia, on December 30. He was 62 years of age. Mr. Benn collapsed at the factory. A resident of Akron since 1900, he started his career at Mohawk as assistant to the founder, the late S. S. Miller, in 1913 on the first day the company opened its doors. At one time he was factory superintendent, and at the time of his death he was in charge of all machinery installations and maintenance for the company. Mr. Benn is survived by his widow and a son.

Clinton B. Sipes

Clinton B. Sipes, general traffic manager of the Firestone Tire & Rubber Co., died at his home in Akron, Ohio, on December 31. He was 55 years of age. Mr. Sipes had been taken to City Hospital more than a week prior to his death after he had suffered a heart attack, but had been removed to his home, apparently on the way to recovery. Mr. Sipes, who had been with Firestone for 26 years, had been traffic head for 15 years and was well known in traffic management circles throughout the country. He was a Mason. Surviving are his widow, a daughter, and two sons.

Dr. John S. Fonda

Dr. John S. Fonda, assistant director of sales of the Grasselli Chemicals Department of E. I. du Pont de Nemours & Co., died in Wilmington, Del., on December 22 at the age of 42. Death resulted from a heart attack due to complications growing out of pneumonia. Before going to Wilmington in 1935, Dr. Fonda had been with the rayon department of the company in Buffalo. He was a graduate of Cornell.

Reduce Antioxidant Content

Because the operators of the synthetic rubber plants have found that the amount of antioxidant used in the production of GR-S could be reduced from 2% to 1.5% without encountering any difficulties, and thus conserve the supply of antioxidants, and because it has been determined that this reduction will not increase the requirements of antioxidant in the compounding of the rubber, the Rubber Reserve Co. has instructed the operators of GR-S plants to use only 1.5% of antioxidant in their production beginning January 1. A notice to this effect has been circulated to the rubber manufacturing industry by the Office of the Rubber Director.

Test New Plioflex Tire

A tire made of Plioflex, a copolymer of vinylidine chloride and vinyl chloride, the third such tire to be made, has finished a test run of 8,000 miles, according to scientists of the Goodyear Tire & Rubber Co. Studies carried on during the test showed that the carcass and treads reached maximum temperatures only slightly higher than those reached in tires of natural rubber and much below those developed in tires of GR-S. Goodyear technologists are certain that they can improve greatly on the mileage of such tires.

Tennis Balls of Synthetic

Edgar Peden, Carl E. Carlson and Peter Gazze (left to right), chief chemist, research director and laboratory supervisor, respectively, of the Pennsylvania Rubber Co., Jeannette, Penna., are seen above studying the first new synthetic rubber tennis balls to roll off the company's production line. In play, the new balls are said to equal pre-war natural rubber balls in every respect, while they surpass them in uniformity, length of life and wearability.

Industrial So-Lo, a product of So-Lo Works, Loveland, Ohio, for repairing breaks, burnt or worn spots, filling holes, and for resurfacing industrial belts, is now being made with synthetic rubber and is said to have greater resistance to oil and grease, less shrinkage, and to spread easily and dry more smoothly.

The 350,000,000th tire built by Goodyear in 42 years of production was completed on November 15. It was an all-synthetic tractor tire. Goodyear's 325,000,000th tire, built on March 10, 1941, was a 55x19.00-23 airplane pneumatic. In August, 1939, the company produced its 300,000,000th tire, the first of the snow cruiser tires constructed for the U. S. Antarctic Expedition to the South Pole. The 250,000,000th unit was constructed three years earlier.

The story of "Zinlac," product of William Zinsser & Co., which is said to duplicate the properties of shellac and, like synthetic rubber, to possess certain unique qualities of its own, is told in a pamphlet being distributed by Arthur D. Little, Inc., Cambridge 42, Mass. C. G. Harford is the inventor of the synthetic shellac.

Ohio Rubber Co., Willoughby, Ohio, engaged 100% in war work, opened an exhibit of its war products in the lobby of the Union Bank of Commerce, Cleveland, on November 23. The exhibit was conducted for two weeks. W. Miller Cook, vice-president of Ohio Rubber, was in charge on the opening day.

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NEW EQUIPMENT

Midget Air Control Valve

An unusually compact solenoid air control valve which can be operated at sustained speeds up to as high as 400 reversals per minute has been developed and introduced by the Ross Operating Valve Co., 6453 Epworth Boulevard, Detroit 10, Mich. The newly

designed valve, known as Ross Model No. 835, is a ¼-inch heavy duty, solenoid-operated, four-way valve for the control of double-acting cylinders. It may also be used as a three-way valve by plugging one outlet. Overall dimensions of the new model, which is of the same poppet type principle the company has featured for years, are 7-inch length, 3½-inch width, and 5¼-inch height. Low current consumption, noiseless operation and long life are special features claimed for it.

New Taylor Level-Buoy

With the announcement of its new Level-Buoy the Taylor Instrument Companies of Rochester, N. Y.,

adds to its line a buoyancy-type instrument which both controls and indicates liquid level. The new instru-

ment employs the Taylor Fulscope Control Mechanism with either completely Adjustable Sensitivity for smooth throttling level control, or Automatic Reset for averaging of liquid level with a minimum disturbance to the process. A torque tube transmits the level changes to the instrument mechanism. This eliminates a stuffing box with its need for lubrication or packing and gives a closed system which eliminates leakage. The torque tube is interchangeable with the ones used in the Taylor Aneroid Manometer which is a real advantage to instrument users in minimizing inventories of spare parts. There are no internal pivots to cause friction or wear. The Level-Buoy handles liquids with specific gravities between .2 and 2.0.

A new **Markal Paintstik Marker** for icy, wet, sleek or oily metal surfaces has been introduced by the Markal Co., 6 East Lake St., Chicago, Ill. Designated as Markal B, the new marker was developed especially for shipyards, steel mills and all other outdoor locations. It comes in a variety of colors.

Method of Vulcanization of GR-I

(Continued from Page 328)

as well as the practical aspect. Thomas, Lightbown, Sparks, Frolich, and Murphree *(4)* have pointed out that the stress-strain curve of butyl rubber cured with sulfur and an accelerator is considerably different from that of natural rubber. Until a strain of about 500 to 700 per cent is exerted on the sample the stress is low, but from this elongation to the breaking point the curve flattens out and is more nearly similar to the stress-strain curve for natural rubber. Any attempts to draw conclusions as to the difference in structure of the rubber and butyl rubber molecules from these stress-strain relationships are of doubtful value, however, when it is recognized that GR-I can be readily vulcanized with Polyac to produce stress-strain curves very similar to those of rubber.

Furthermore, some of the conclusions that have been made concerning the elasticity of rubber and butyl rubber, based on the shape of the stress-strain curves, may have to be revised. Figure 2 illustrates typical stress-strain curves of natural rubber and of GR-I cured with a combination of a thiuram and Polyac, and shows the similarity between the latter curve and the one for rubber.

It can therefore be seen that by the use of Polyac, vulcanizates of GR-I can be obtained which more nearly resemble rubber and GR-S vulcanizates in both their physical properties and in their stress-strain relationships. Polyac is a valuable tool which can be used to overcome many of the deficiencies of GR-I, and which at the same time will enhance many of the good properties of this elastomer. It may therefore serve to greatly broaden the fields of usefulness of GR-I and make it available for applications for which it heretofore has not been suited.

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REVIEWS

BOOKS

Synthetic Resins and Rubbers. By Paul O. Powers. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y. 5½ x 8½ in. 296 pp. $3.00.

This is the first single volume to cover the chemistry of synthetic resins and rubbers. Specifically, the book describes briefly the chemistry of polymers, particularly those of commercial importance, and their applications. A good deal of the material used is similar to that used in ESMDT and ESMWT courses in plastics given at Franklin and Marshall College by the author and others. The author, incidentally, is chief of organic research of the Armstrong Cork Co.

The book is divided into six parts, as follows: (1) Theories of Polymer Formation; (2) Condensation Polymers; (3) Vinyl Polymers; (4) Synthetic Rubbers; (5) Resins from Natural Products; and (6) Application of Synthetic Resins. In addition to a number of references furnished at the end of each section there is also a series of review questions. These questions enable the student to improve his self-education.

The section on synthetic rubber, written by Dr. K. H. Weber, also of the Armstrong Cork Co., is very well done. Starting with the chemistry and structure of natural rubber, Dr. Weber then covers polychloroprene, polybutadiene, polysulfide and polybutene rubbers. Polymerization, structure, manufacture, properties and application are discussed for each type of synthetic and some theories reviewed.

An interesting historical outline of synthetic polymer developments is included in the book, which also has a carefully cross-referenced subject index.

•

Trail Blazing in the Skies. By Shafto Dene. Published by the Goodyear Tire & Rubber Co., Akron, Ohio. 5¾ x 9 in. 112 pp.

The history of aeronautics, closely entwined with the growth and development of the Goodyear Tire & Rubber Co., which has made several outstanding contributions to the aeronautical art, is told in this new book. It is a typical American saga—the history of Goodyear's rise from small beginnings to its present unique position as the nation's only prime manufacturer of both complete heavier and lighter-than-air craft.

The book is replete with historical data—the first airplane tire, coming of commercial airships and balloons, organization of the first blimp fleet, creation of the Akron and the Macon, development of the modern fighting craft, self-sealing gasoline tanks, life-saving equipment, and lighter-than-air in modern warfare. Of special interest is a 32-page picture section which emphasizes the developments discussed in the book.

•

Health on the Production Front. National Association of Manufacturers, 14 West 49th St., New York 20, N. Y. 6 x 8½ in. 80 pp.

The result of related surveys and studies made of the health problem within the nation's plants, factories and shops in the past year, inaugurated by the N.A.M. under the direction of Dr. Victor G. Heiser, internationally-known medical authority, this booklet is virtually a wartime guide to the industrial health and staying powers of the millions of America's war workers. Every plant health problem from absenteeism to vitamins is covered. The most effective methods tested by the trial-and-error system, to utilize existing manpower to the fullest extent known, and in the healthiest way possible, are presented to industrial management in the booklet.

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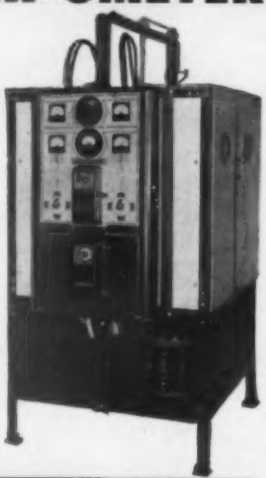

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Emulsion Technology. Published by Chemical Publishing Co., Inc., 26 Court St., Brooklyn, N. Y. 5½ x 8½ in. 290 pp. $5.00.

The symposium on emulsions held by the British Section of the International Society of Leather Trades' Chemists some time ago, brought together some of the foremost European colloid chemists. The papers presented at that symposium were originally published under the title of *Technical Aspects of Emulsions*, which ran to three editions and which is now out of print. Because of the numerous requests for that book and because of new developments in emulsion technology, it was decided to bring out a new edition with certain revisions and additions—the latter by American specialists. This book is the revised edition.

To round out the theoretical and practical aspects of emulsion presented in the original book, there have now been added a section by M. P. Hoffman, an authority on the use of colloid mills and homogenizers; a section by R. M. K. Cobb, an authority on paper treating emulsions; and a section by S. Werthan, a specialist on water emulsion paints and other coatings. Authoritative data on methods and formulation of many practical commercial emulsions in the drug, cosmetic, beverage, wax, coating and paint fields has also been added, as well as a comprehensive list of all important commercial emulsifying agents.

The current edition has 15 chapters in all, including one on latex by H. P. and W. H. Stevens, of England, and a cross-referenced subject index. Like the first edition, it serves to bridge the gap between theory and practice.

•

Abstracts on Synthetic Rubber (in Two Parts): Part I—Articles; Part II—Patents. By Muriel E. Whalley. Issued by National Research Council of Canada, Ottawa, Canada. 8½ x 11 in. each. Part I, 362 pp. Part II, 200 pp. Mimeographed. Price: $2.00 for each Part.

This publication, arranged in two parts for convenience of reference, contains a selection of abstracts dealing with processes of manufacture of the various synthetic rubbers and related subjects and the properties which have been recorded for the unvulcanized and, to a lesser extent, the vulcanized material. Abstracts covering uses have also been included, but in this case the selection has been based chiefly on the characteristic properties of each particular type of synthetic rubber.

Part I consists of 829 abstracts of articles, arranged in alphabetical order by authors, with a selected subject index and a bibliography of 123 articles and books. Part II comprises 714 abstracts of patents arranged in chronological order with an index of patentees and a numerical patent index arranged according to countries. The compilations were made from existing bibliographical sources, including *Chemical Abstracts, Summary of the Current Literature,* and the Marchionna and Cable bibliographies.

BOOKLETS, CATALOGS, Etc.

Production for Victory: 1943. National Association of Manufacturers, 14 West 49th St., New York 20, N. Y. 6 x 8½ in. 64 pp.

This comprehensive survey rounds out the two-year war production report of American industry since Pearl Harbor. Its documented facts and figures serve as eloquent testimony to the production job generally termed "a miracle." The charts included, and the accompanying text, fall into three main categories: (1) Goals and achievements, particularly with respect to the production of leading types of military and naval equipment; (2) The expansion of industrial facilities and production to meet the expanding requirements; and (3) The problems of civilian goods, food supply and manpower. Approximately two pages of the report are devoted to the synthetic rubber industry.

Rubber, Polyisoprenes, and Allied Compounds. IV. The Relative Tendencies towards Substitutive and Additive Reaction during Chlorination. (Publication No. 37). By G. F. Bloomfield. British Rubber Producers' Research Association, 19 Fenchurch St., London, E. C. 3, England. 7¼ x 9¾ in. 8 pp.

It has been previously observed that when chlorine reacts with rubber much hydrogen chloride is evolved. This reaction led to the suggestion that the halogenation process may be one of substitution and not of addition at the double bonds. The current report, one of a series in the program of fundamental research inaugurated by the B.R.P.R.A., is devoted to the character of this reaction as it applies to rubber and to certain other olefins. The main reaction appears to be substitutive, but the products show marked loss of unsaturation as determined by the iodine-value method. This loss, according to the conclusions drawn, is probably partly real, due to the occurrence of some degree of cyclization, and partly apparent, due to inhibition by the incorporated chlorine atoms of ready iodine chloride addition during the determination.

•

The Course of Autoxidation Reactions in Polyisoprenes and Allied Compounds. III. The Oxidation of Rubber in the Presence of Acetic Acid or Acetic Anhydride. (Publication No. 38). By G. F. Bloomfield. British Rubber Producers' Research Association, 19 Fenchurch St., London, E. C. 3, England. 7¼ x 9¾ in. 6 pp.

As indicated by the title, this is another report on the series of investigations which form part of the program on fundamental research undertaken by the B.R.P.R.A., this one being on the oxidation of rubber in the presence of acetic acid or acetic anhydride. The tests resulted in the following conclusions: (1) Rubber takes up substantial amounts of oxygen in the presence of acetic acid or anhydride, but reaction is very slow and restricted in character unless a temperature well above 100° is used; (2) the rubber becomes increasingly degraded as the oxygen content of the product rises; and (3) only a portion of the oxygen incorporated is in the form of acetoxyl groups, especially where the presence of a hydrocarbon diluent causes the acetic acid or anhydride to be in low concentration.

•

Natural Rubber and Synthetic Rubber. By Norman Bekkedahl. Instituto Agronomico do Norte, Belem, Para, Brazil. 6 x 9 in. 16 pp.

This booklet contains a reproduction of the talk made by Dr. Bekkedahl at the Instituto Agronomico do Norte on November 5, 1943. Dr. Bekkedahl, a member of the National Bureau of Standards, is currently chief of the rubber laboratory at the Instituto in Belem. In his talk, Dr. Bekkedahl made some general comparisons between the properties of natural and synthetic rubbers, and briefly touched on the economics involved. He mentioned the fact that the potentiality of Brazilian rubber was still vast and indicated that extensive research might uncover new hybrids of the Hevea tree which will not only give far greater yields than achieved heretofore but which will be resistant to the common leaf disease. The booklet is printed in Spanish with a complete English translation included.

•

Properties and Uses of Zinc Borate-3167. New Jersey Zinc Co., 160 Front St., New York, N. Y. 6 x 9 in. 16 pp.

The story of Zinc Borate-3167, a zinc borate of low water solubility developed to meet the demand for fire-retardant materials which also provide resistance to mildewing, weathering, water and other solubilizing agents, is told in this booklet. The physical and chemical properties of the material, together with present and post-war applications, are included. The booklet also includes a review of the present practice of imparting fire resistance to textile and other materials.

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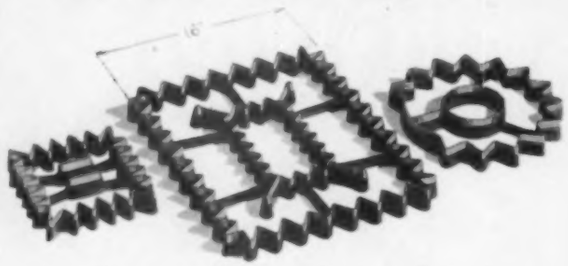

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REVIEWS (CONT'D)

Liquid Densities of Eleven Hydrocarbons. (Letter Circular LC-736). Compiled by C. S. Cragoe. National Bureau of Standards, Washington, D. C. 8 x 10½ in. 26 pp.

Undertaken at the request of the Rubber Reserve Co., this report presents three separate tables indicating the liquid densities of eleven hydrocarbons found in commercial C_4 mixtures, all occurring in feed stocks for 1,3-butadiene manufacture, for use in weight and volume conversions. Hydrocarbons covered, in addition to 1,3-butadiene itself, are propane, propene, n-butane, iso-butane, 1-butene, cis-2 butene, trans-2 butene, iso-butene, n-pentane and iso-pentane. The three tables prepared are in different units, namely, grams per milliliter, pounds per gallon, and density ratios relative to the density at 60° F. The temperature range from —50° to 140° F. is covered with values tabulated at every 1° F. from 0° to 120° F. and every 2° F. outside this interval. The densities were calculated from equations, assuming that the sum of liquid and vapor densities at saturation is a linear function of temperature.

•

Hydraulic Straightening and Bending Presses. (Bulletin No. 320-A). Watson-Stillman Co., Roselle, N. J. 8½ x 11 in. 38 pp.

The line of straightening and bending presses featured by Watson-Stillman is illustrated and described in this new catalog which, in addition, includes tables of work capacities, engineering tables, and other technical data. Ten of the company's standard presses are treated individually in separate sections, including moving table presses, column type stationary presses, portable pipe benders, and casting straightening presses. A separate section covers miscellaneous presses. Each different machine is fully described and illustrated, indicating its versatility in many kinds of straightening and bending operations.

•

Wartime Information for the Delivery Truck Operator. Studebaker Corporation, South Bend 27, Indiana. 6 x 9 in. 52 pp.

The complete text of ODT 17, which established wartime delivery restrictions and which became effective last October, of special importance to delivery truck operators, is included in this new educational booklet, as are authoritative interpretations covering both the regulations and general permits issued under them. This material is supplemented by a series of questions and answers on the entire subject of government regulation of wholesale and retail deliveries. An important section of the booklet is devoted to suggestions regarding truck conservation and maintenance in wartime.

•

Facts About Synthetic Rubber. New York Belting & Packing Co., 1 Market St., Passaic, N. J. 6 x 9 in. 36 pp.

Some general information on the five commercial types of synthetic rubber—Buna S, Buna N, neoprene, Butyl and Thiokol—is given in this attractively printed, two-color booklet. It is intended to give industrial plant operators an over-all picture of the history of synthetic rubber and some fundamental facts about its production. The characteristics of each of the five commercial types which make each particularly adaptable to specific services are stressed. The physical and chemical properties of the synthetics are shown in table form.

•

Wheelco Potentiotrol. Wheelco Instruments Co., Harrison and Peoria Sts., Chicago 7, Ill. 8½ x 11 in. 8 pp.

In addition to describing the Wheelco line of potentiotrols, this bulletin also describes the potentiometer method of heat measurement and explains the electronic principle employed in the company's instruments to gain instant control in line with the temperatures recorded. Four operating diagrams and a table of potentiotrol scale ranges obtainable with various thermocouples and a photo-electric pick-up unit are also included.

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REVIEWS (CONT'D)

Chemigum. Goodyear Tire & Rubber Co., Akron, Ohio. 8½ x 11 in. 56 pp.

Intended for those technically concerned with the use of rubber or synthetic rubber, this booklet presents a complete picture (as far as it may be presented under wartime conditions) of the manufacture, development and application of Chemigum, particularly Chemigum N, the oil-resisting type of synthetic rubber. There are also included data on the other synthetics for which Goodyear has developed lines of compounds, including some neoprene and Thiokol compounds. This is done in the knowledge that while many applications can be filled by more than one type of synthetic, there are applications whose requirements indicate the use of one certain synthetic for best results. The entire booklet is attractively printed in two colors and is replete with illustrations. An interesting multi-colored flow sheet of the Chemigum N process is included.

•

How to Train Workers Quickly. By Glenn Gardiner. Published by Elliott Service Co., 219 East 44th St., New York 17, N. Y. 5½ x 8 in. 64 pp. 45c per copy (lower price in quantity).

The very latest and best methods of job instructor training are incorporated in this booklet, which is actually a manual for training men and women in war-time. It is a practical follow-up and refresher course for any job instructor training that foremen, supervisors and department heads may have had. The booklet is divided into three sections: (1) How to Instruct; (2) Training Women; and (3) Appendix. The last section contains a series of practical "self-test" questions by which a foreman can check his knowledge of job instruction.

•

Eemco Rubber Working Machines. Erie Engine & Mfg. Co., 953 East 12th St., Erie, Penna. 8¾ x 11¼ in. 16 pp.

This attractive, spiral-bound catalog illustrates and describes several of the rubber working machines offered by the company. Included are descriptions of hydraulic presses, tubers and strainers, mills and calenders. The company manufactures a complete line of calenders from the 8 x 14-inch laboratory size up to and including the 24 x 66-inch size. Features of each piece of equipment are stressed in the catalog.

•

GR-S Inner Tube Compounding. R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 8½ x 11¼ in. 4 pp.

Suggestions regarding three Vanderbilt materials—P-33, Rio Resin and Selenac—in GR-S inner tube compounding are contained in this latest laboratory report. The results of tests made on a series of GR-S compounds containing P-33 in conjunction with other carbon blacks are given. One of the results indicated is that the addition of Rio Resin to the sulfur-cured compounds (20% on the GR-S) minimizes hardening, stiffening and shortening during heat aging.

•

What management can really do to reduce *absenteeism* is the subject of Report No. 144 issued by the George S. May Business Foundation, 111 So. Dearborn St., Chicago, Ill. The cases of both management and labor are presented impartially.

•

Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y., has issued the 1943-44 edition of its *catalog of technical and scientific books.* Both a subject and author index is included.

•

Why, when and where flow meters and instruments are needed in the modern plant, and how they can be made to further the war effort, is covered in a reprint on *Flow Meter Engineering* recently made available by the Cochrane Corp., Philadelphia 32, Penna.

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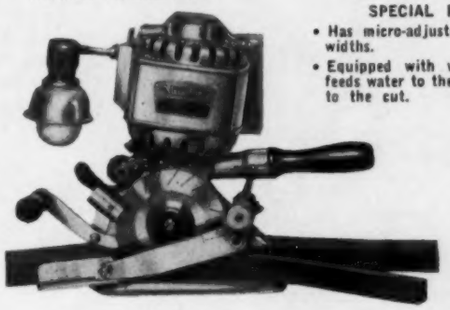

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Samples, prices and additional information on request

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3343

MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, Jan. 7, 1944

Crude Rubber

ACCORDING to an announcement made on December 28, the International Rubber Regulation Committee will shortly suspend its regulatory functions and will be supplanted in the near future by "a new and more widely representative committee for consultation and collection of information." This decision came as no great surprise to the industry, since the acquisition of the Far Eastern rubber areas by the Japanese left little other than areas in Ceylon and India for the Committee to regulate. The three signatories to the regulation—Britain, India and The Netherlands—have extended the pact for four months until next April 1, but without resuming rubber regulations.

The action of the Committee was generally interpreted to mean the inclusion of the United States, and possibly several if not all of the Latin American countries, in a new world scheme for natural rubber. This theory was strengthened by an official British announcement to the effect that "it is the hope of the three governments that all other countries with a substantial interest in rubber or rubber substitutes, whether producers or consumers, will join the proposed committee."

Unlike the previous arrangement, the newly-proposed committee would provide no machinery for the regulation of plantings, production or exports of rubber, but will be primarily for consultation and the assembly of data. It is to be presumed, however, that its functions would be considerably expanded, possibly to regulate both the production of crude and synthetic rubber in all parts of the world, once the vast rubber-producing areas of the Far East are released from Japanese clutches. There is little doubt that world demand for rubber for several years after the complete cessation of hostilities will call for all of the crude and synthetic which can be produced.

	C	N-C
Plantations—		
Ribbed Smoked Sheets, 1X	22½	40
Thick Pale Latex Crepe, 1X	22½	40
Thin Pale Latex Crepe, 1X	22½	40
Thick Brown Crepe, 1X	21⅜	38⅞
Thin Brown Crepe, 1X	21⅜	38⅞
Thick Remilled Blankets, #1	21⅜	38⅞
Rolled Brown or Flat Bark	18	35½
Smoked Blankets, #1	21⅛	38⅝
Claro Brand 1XRSS	22½	40
Sole Crepe Trimmings	22	39½
Sole Crepe	22½	40
Wild—		
Uncut Fines, Crude	15	29
Cut Fines, Crude	15½	29¾
Cut Fines, Washed & Dried	22½	40
Upriver Coarse, Crude	12⅝	26⅝
Upriver Coarse, Washed & Dried	20¼	37¾
Caucho Ball, Crude	11⅝	24¾
Caucho Ball, Washed & Dried	19½	37
Guayule—		
Carload Lots	17½	31
Less than Carload Lots	18	31½
Balata—		
Surinam Sheet	42½	42½
Manaos Block	38¾	38¾
Colombian Block	38¾	38¾
Peruvian Prime	38¾	38¾
Chicken Wire	23¼	23¼
Latex—		
Normal, Tank Car Lots	26	43½
Creamed, Tank Car Lots	26¾	44¼
Centrifuged, Tank Car Lots	27¾	45¾
Heat-Concentrated, Carload Drums	29½	47

C, for Civilian Use; N-C, for Non-Civilian Use.

Scrap Rubber

The year-end saw the retirement of the Rubber Reserve Co. from the scrap rubber field, announcement of which was made in our last issue. Since its entry into the scrap rubber game in June, 1942, according to an official announcement, Rubber Reserve purchased more than 1,000,000 short tons and sold approximately 740,000 short tons to reclaimers and other consumers. The present government stockpile of about 350,000 short tons will be liquidated slowly and in such manner that it will not interfere with normal trade developments. The maximum price for pneumatic tire carcass fabric prepared for use in the manufacture of auto tire patches and reliners or as material for shoe soles was set at 8c per pound, delivered, by OPA on January 6. Previously, this material was not specifically priced by OPA, except as miscellaneous scrap rubber for which the ceiling price was ¾c a pound. Prices shown below are ceilings on typical grades of scrap:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$20.00
Beadless truck tires	ton	26.00
Mixed truck tires	ton	20.00
Beadless passenger tires	ton	26.00
No. 1 passenger peelings	ton	52.25
No. 1 truck peelings	ton	52.25
No. 2 passenger tubes	lb.	.07¾
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06¾
Mixed passenger tubes	lb.	.06½
No. 2 truck tubes	lb.	.07½
Red truck tubes	lb.	.07¼
Black truck tubes	lb.	.06½
Buffings	ton	35.00
Bicycle tires	ton	15.00
Air bags and water bags	ton	15.00
Boots and shoes	ton	33.00

Tire Fabrics

The situation in the tire fabric field remains unchanged, with practically no demand for such fabrics. Consequently, prices are nominal and in many quarters are not even being quoted. The prices shown below are those which were in force on or about January 15, 1942.

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.43½ @	.44
Peeler, carded, 23/4/3	lb.	.44½ @	.45
Peeler, carded, 15/3/3	lb.	.41½ @	.42
Peeler, carded, 15/4/2	lb.	.41½ @	.42
Peeler, carded, 13/3/3	lb.	.40½ @	.41
CHAFERS			
Carded, American, 1 1/16"	lb.	.43½ @	.44
Carded, American, 1"	lb.	.39½ @	.48

Sheetings

48x40	36 in.	5.50	lb.	— @	7.818
40x40	36 in.	6.15	lb.	— @	6.991
40x36	36 in.	6.50	lb.	— @	6.615
48x48	40 in.	2.50	lb.	— @	16.200
48x48	40 in.	2.85	lb.	— @	14.210
56x60	40 in.	3.60	lb.	— @	11.944
48x44	40 in.	3.75	lb.	— @	11.066

Note: Prices shown above are ceiling prices set by order of the O.P.A. Quotations are based on an average price of 15-16-inch middling cotton of 20.37c at the ten designated southern markets.

Cotton

Fluctuations in middling uplands were within a range of 48 points on the Cotton Exchange since our last report (December 14), high for the period having been 20.75 on January 7 and low 20.27 on December 21. While the movement in general was upward, the holiday period had a depressing effect on the market and, with the war preparations supposed to be adding the last touches for offensive action on a major scale, it was not surprising that only a few wanted to go through the season with extended lines. The market experienced about the normal amount of pre-holiday evening-up and, as usual, this meant that the weaker interest was on the long side. Just what the outlook for consumption is during the second half of the season is not clear, but it is doubtful that the drop in war orders will decline any further and it is thought by some in the trade that the demand from this source will increase somewhat from the Red Cross, Medical Corps, Lend-Lease, etc. Certainly civilian demands are heavier. The market has shown a definite upward trend since the turn of the year and there are signs pointing to more active mill operating. The Commodity Credit Corporation reports that loans were made through December 25 on 2,618,715 bales of 1943-crop cotton. Quotations for middling uplands on the Exchange follow:

	Dec. 14	Jan. 7		
	Close	High	Low	Close
March	**19.55**	**19.95**	**19.78**	**19.88**
May	19.34	19.70	19.52	19.62
July	19.13	19.46	19.26	19.37

Reclaimed Rubber

Reclaimers report an increase in demand from practically all branches of the industry over and above the high demand which has been in existence for the past several months. This increased demand stems from the latest regulatory rubber manufacturing regulations which are designed to hold down the consumption of crude to an absolute minimum. In many cases, the use of reclaim is now unlimited, as are the general purpose synthetics. Manufacturers show an increased tendency to use blends of synthetic and reclaim where possible, which adds to the growing demand for reclaim. Camelback, however, still accounts for a sizeable portion of reclaim. Prices shown below are ceilings on typical grades:

Shoe				
Unwashed	lb.	.07 @		.07¼
Tube				
Black Tube	lb.	.11¼ @		.11½
Red Tube	lb.	.12 @		.12¼
Tires				
Black (acid process)	lb.	.07½ @		.07¾
Black, selected tires	lb.	.06½ @		.06¾
Truck, Heavy Gravity	lb.	.08½ @		.08¾
Miscellaneous				
Mechanical blends	lb.	.04½ @		.05½
White	lb.	.13 @		.13¼

Ducks

Enameling (single filling)	lb.	— @	.44¼
Belting and Hose	lb.	— @	.39
Single filling, A grade	lb.	— @	.19¾
Double filling, A grade	lb.	— @	.20¾

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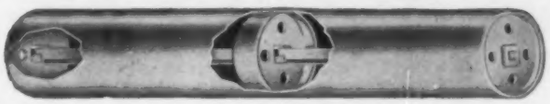

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58/60% Creamed Concentrate

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CHEMICAL MARKETS

New York, Jan. 7, 1944
All Prices F.O.B. Works

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.28 @	.33
A-10	lb.	.36 @	42
A-19	lb.	.52 @	.65
A-32	lb.	.60 @	.70
A-77	lb.	.42 @	.55
A-100	lb.	.42 @	.55
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	.43 @	.45
Beutene	lb.	.59 @	.64
B-J-F	lb.	.38 @	.43
Butasan	lb.	— @	1.13
Butyl Zimate	lb.	— @	1.13
Captax	lb.	.38 @	.40
Crylene	lb.	.40 @	.47
Di-Ortho-Tolyguanidine	lb.	.44 @	.46
Diphenylguanidine	lb.	.35 @	.45
El-Sixty	lb.	.40 @	.47
Ethasan	lb.	— @	1.13
Ethyl Zimate	lb.	— @	1.13
Ethylidine aniline	lb.	.42 @	.43
Formaldehyde aniline	lb.	.31 @	—
Guantal	lb.	.39 @	.48
Hepteen	lb.	.34 @	.39
Hexamethylenetetramine	lb.	.33 @	—
Lead Oleate, No. 999	lb.	.13 @	—
Witco	lb.	.15 @	—
Ledate	lb.	— @	1.48
Methasan	lb.	— @	1.23
Methyl Tuads	lb.	— @	1.53
Methyl Zimate	lb.	— @	1.23
Monex	lb.	— @	1.53
Pentex	lb.	.74 @	.84
Phenex	lb.	.50 @	.55
Pip-Pip	lb.	— @	1.63
R & R 50-D	lb.	.42 @	.43
R-2 Crystals	lb.	— @	1.55
Rotax	lb.	.48 @	.50
Safex	lb.	1.15 @	1.25
Santocure	lb.	.60 @	.67
Selenac	lb.	— @	1.98
SPDX	lb.	.70 @	.75
Super-Sulfur No. 2	lb.	.13 @	.15
Thiocarbanilid, drums	lb.	.28 @	.33
Thiofide	lb.	.43 @	.50
Thiotax	lb.	.38 @	.45
Thiurad	lb.	— @	1.53
Trimene	lb.	.54 @	.64
base	lb.	1.03 @	1.18
Triphenylguanidine	lb.	.45 @	—
Ultro	lb.	1.25 @	1.75
Ureka	lb.	.50 @	.57
Blend B	lb.	.50 @	.57
Blend C	lb.	.48 @	.55
Vulcanex	lb.	.42 @	.43
Vulcanol	lb.	.85 @	—
Inorganic			
Litharge, domestic	lb.	.07 @	.07½
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blues [b]			
Prussian	lb.	.36 @	—
Ultramarine	lb.	.17 @	.27
Browns [b]			
Mapico	lb.	.1135@	—
Umber, Turkey	lb.	.04¼@	—
Greens [b]			
Chrome	lb.	— @	.25
Guignet's Green	lb.	.70 @	—
Reds			
Antimony			
crimson, 15/17	lb.	— @	—
sulfur, free	lb.	— @	—
Indian	lb.	.08¼@	—
Domestic (Maroon)	lb.	.11 @	—
Mapico	lb.	.096 @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red	lb.	.09¼@	—
Whites [b]			
Cryptone No. 19	lb.	.0560@	.0585
Cryptone CB No. 21	lb.	.0560@	.0585
Cryptone ZS-800	lb.	.0825@	.0850
Lithopone:			
Albalith	lb.	.04¼@	.04½
Astrolith	lb.	.04¼@	.04½
Axolith	lb.	.04¼@	.04½
Ray-cal	lb.	.05½@	.05¾
Rayox	lb.	.14½@	.15¾
Titanox A	lb.	.14½@	.14¾
Titanox B	lb.	.05¾@	.06
Titanox C	lb.	.05½@	.05¾
Zinc Oxide—American Process [b]			
American Azo:			
ZZZ (lead free)	lb.	.07¼@	.07½
Anaconda, lead free	lb.	.07¼@	.07½
Horsehead Lead Free Brand:			
Special—3	lb.	.07¼@	.07½
XX Red—4	lb.	.07¼@	.07½
XX Red—72	lb.	.07¼@	.07½
XX Red—103	lb.	.07¼@	.07½
Kadox, black label—15	lb.	.07¼@	.07½
Red label—17	lb.	.07¼@	.07½
St. Joe, black label	lb.	.07¼@	.07½
green label	lb.	.07¼@	.07½
red label	lb.	.07¼@	.07½
U. S. P.—7, bbls.	lb.	.10½@	.10¾
Zinc Oxide—French Process: [b]			
Florence White Seal—7 bbl.	lb.	.09½@	.09¾
Green seal—8	lb.	.09 @	.09¼
Red seal—9	lb.	.08½@	.08¾
Yellows [b]			
Cadmolith	lb.	.55 @	.60
Chrome	lb.	— @	.50
Mapico	lb.	.071 @	—

[a] Price Ceilings.
[b] Price Suggestions or Agreements.

BLACKS
(In bags, carload lots)

Aerfloted Arrow		.0355@	—
Atlantic		.0355@	—
Certified		.0355@	—
Certified Spheron		.0355@	—
Channel "S"		.12 @	—
Continental		.0355@	—
Disperso		.0355@	—
Dixiedensed		.0355@	—
Dixiedensed 66		.0355@	—
Excello		.0355@	—
Furnex		.03½@	.06
Furnex Beads		.03½@	.06
Gastex		.03½@	.06
Kosmobile		.0355@	—
Kosmobile 66		.0355@	—
Kosmos-Dixie 20	lb.	.03½@	.06
Micronex (Amarillo)		.0355@	—
Micronex Beads (Amarillo)		.0355@	—
Pelletex		.03½@	.06
P-33		.0475@	—
Shell Carbon (Del. Midwest)		.0240@	—
Sterling		.035 @	—
Supreme		.0355@	—
Thermax		.0225@	—
Thermax "S"		.0675@	—
Wyex		.0355@	—

COMPOUNDING MATERIALS

Aluminum Flake	ton	18.00 @	24.50
99½%-300	ton	— @	16.50
86-90%-300	ton	— @	13.50
Asbestine	ton	16.50 @	20.00
Atomite	ton	— @	27.50
Barium carbonate (98-100%)	ton	47.00 @	49.00
Barytes	ton	25.35 @	36.00
Bentonite	ton	11.00 @	16.00
Blanc fixe, dry	ton	60.00 @	67.50
Calcene	ton	37.50 @	43.00
Catalpo (fact)	lb.	.02 @	—
Chalk, precipitated			
Suprex white	ton	32.50 @	45.00
Clay, Aerfloted, Suprex	ton	10.00 @	22.50
Aerfloted Paragon	ton	10.00 @	22.50
Crown	ton	— @	11.00
Dixie	ton	— @	11.00
Kaolloid	ton	— @	9.00
Langford	ton	— @	8.50
McNamee	ton	— @	10.00
Par	ton	— @	11.00
Witco	ton	10.00 @	—
Kalite No. 1	ton	— @	26.00
Kalite No. 3	ton	— @	36.00
Kalvan	ton	— @	100.00
Kalvan "S"	lb.	— @	.09½
Keystone white	ton	— @	14.00
Magnesium carbonate	lb.	.06¼ @	—
Mineralite	ton	— @	30.00
Pyrax A	ton	— @	7.90
Rottenstone (powd. Dom.)	ton	25.50 @	37.50
Rubberol	lb.	— @	.17½
Silene EF (calcium silicate)	lb.	.055 @	.06
Snowflake white	ton	— @	16.00
Tale, domestic	ton	17.00 @	25.00
Whiting, commercial	ton	16.00 @	26.00
Witco	ton	6.00 @	—
Witcal	ton	— @	100.00
Witcarb R-12	ton	— @	40.00
Wood Flour (100 mesh)	ton	30.00 @	32.00

MINERAL RUBBER

285°-300° Mineral Rubber	ton	25.00 @	—
Black Diamond	ton	25.00 @	—
Hard Hydrocarbon	ton	25.00 @	27.00
MilliMar	lb.	— @	.05½

MISCELLANEOUS

Aromatics—Rodo #0	lb.	4.00 @	4.50
Rodo #10	lb.	5.00 @	5.50
Curodex 19	lb.	2.75 @	—
Curodex 188	lb.	3.50 @	—
Curodex 198	lb.	4.50 @	—
Para-Dors	lb.	4.50 @	—
Aresklene No. 375	lb.	.35 @	.50
Darvan (dispersing agent)	lb.	.30 @	.34
Santomerse S	lb.	.11 @	.25
Sponge Paste	lb.	— @	.18
Sunproof	lb.	.22¼@	.27¾
Tonox	lb.	.50 @	.59
Ty-Ply	gal.	6.75 @	8.00
Unicel (blowing agent)	lb.	.50 @	—

SOFTENERS

Acids			
Acetic, 28%, bbls.[a]	100 lb.	3.38 @	3.63
Nitric, 36 degrees	cwt.	5.00 @	—
Acids, Fatty			
Laurex	lb.	.14¾@	.17¼
SL #10	lb.	.12 @	.14
Stearex Beads	lb.	.10 @	.11
Stearite	lb.	.10 @	—

Alkalies

Caustic Soda, 76%	cwt.	2.70 @	5.20
Soda Ash, 58%	cwt.	1.15 @	2.90

Oils

Degras, bbls.	lb.	.10 @	.12
Para-Flux	gal.	.17 @	.18
Para-Lube	lb.	.046 @	.048
Petrolatum, amber [b]	lb.	.03½@	—
Pigmentaroil ,tank cars	gal.	.20½@	—
in drums	gal.	.26½@	.27½
Pine, tanks	gal.	.55 @	—
Rosin Oil, cmpd.	gal.	.40 @	—
Rubberol	lb.	.13½@	.14
Rubtack	lb.	.10 @	—
Seedine, c.l.	lb.	.07¼@	—
Witco Palm Oil	lb.	— @	—
Witco Softener No. 20	gal.	.20 @	—
Woburn No. 8, c.l.	lb.	.06 @	—

Resins and Pitches

Pitch, Burgundy	lb.	.06 @	—
coal tar	ton	19.00 @	22.00
hardwood	ton	16.00 @	22.50
pine, 200 lb. gr. wt.	bbl.	— @	4.50
Pigmentar, tank cars	gal.	.20½@	—
in drums	gal.	.26½@	.27½
Retort Pine Tar, drums	gal.	.26½@	.27¾

Solvents

Acetone, pure [a]	lb.	.07 @	—
Benzene, 90%, tank car	gal.	.14 @	—
Beta-Trichlorethane	gal.	— @	.20
Bondogen	lb.	.98 @	1.05
Carbon, bisulfide	lb.	.05 @	.08¼
Carbon tetrachloride	gal.	.83 @	1.27
Dichlorethylene	lb.	— @	—
Dipentene, cml., drums	gal.	.48 @	.50
Ethylene dichloride	lb.	.07½@	.08¾
Plastogen	lb.	.07¾@	.08
Reogen (drums)	lb.	.11½@	.12
Rub-Sol	gal.	.09½@	—
Trichlorethylene	lb.	.08 @	.09¼
Turpentine, spirits	lb.	.78½@	—
dest. dist., drums	gal.	.50 @	.55

Waxes

Beeswax, white [b]	lb.	.58 @	—
Carnauba, yellow [b]	lb.	.83¼@	—
Ceresin, white, dom.	lb.	.13½@	.15
Montan, crude	lb.	— @	—
Paraffin [a]			
Yellow crude scale, 124/126	lb.	.04¼@	—
Refined, 123/125	lb.	.05¼@	—

ANTI-OXIDANTS

Agerite Alba	lb.	1.95 @	2.05
Gel	lb.	.52 @	.54
Hipar	lb.	.61 @	.63
Powder	lb.	.43 @	.45
Resin	lb.	.43 @	.45
Resin D	lb.	.43 @	.45
White	lb.	1.23 @	1.33
Albasan	lb.	.69 @	.74
Antox	lb.	.54 @	.56
B-L-E	lb.	.43 @	.52
Flectol H	lb.	.43 @	.55
Flectol White	lb.	.89 @	1.00
Neozone A, B, C, D, E	lb.	.43 @	.63
Oxynone	lb.	.77 @	.90
Retardex	lb.	.45 @	.48
Santoflex B	lb.	.43 @	.55
Santoflex BX	lb.	.54 @	.64
Santovar O	lb.	1.15 @	1.40
S.C.R.	lb.	.33 @	.35
Stabilite	lb.	.52 @	.54
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.43 @	.52

EXTENDERS

Naftolen R-100	lb.	.10 @	.12
Vanzak	gal.	.05 @	.06

LUBRICANTS—MOLD & RUBBER SURFACE

Aresklene	lb.	.35 @	.50
Cocoa Soapstock	lb.	.06 @	.08
Colite	gal.	.90 @	1.15
Dipex	lb.	.06 @	.08
Glycerized Liquid Lubricant	gal.	— @	1.35
Lubrex	lb.	.25 @	.30
Mineralite	ton	— @	30.00
Sericite	ton	65.00 @	75.00
Soap Tree Bark, cut, sifted	lb.	.06 @	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.25 @	—
Amberex Type B	lb.	.18¾@	—
Black	lb.	.08½@	.13
White	lb.	.09 @	.15
Brown	lb.	.10 @	.14
Neophax A	lb.	.16½@	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.08 @	.12
Sulfur Chloride, yellow (drs.)	lb.	.03 @	.08
Sulfur, rubber makers			
Refined (bags)	cwt.	2.55 @	—
Commercial (bags)	cwt.	2.20 @	—
Telloy	lb.	1.75 @	—
Vandex	lb.	1.75 @	—

The WHERE-TO-BUY Section of THE RUBBER AGE in which are listed the Products and Services of the Leading Suppliers to the Industry.

The Market Place

If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York 19, N. Y.

Chemicals and Compounding Materials —

ACCELERATORS—
El-Sixty; Ureka; Ureka C; Guantal; Santocure; DPG; Pip Pip; A-10; A-32; A-46; A-100; R-2 Crystals • ANTIOXIDANTS—Flectol H, White; Santoflex B, BX; Santovar O.
MONSANTO CHEMICAL CO.
Rubber Service Dept.
1012 Second National Bldg., Akron, Ohio

AERO BRAND
RUBBER CHEMICALS
DPG—DOTG—Accelerator 49
Rubber Sulphur
American Cyanamid & Chemical Corporation
30 Rockefeller Plaza, New York, N. Y.

ALUMINUM FLAKE
A uniform, fine, low gravity, white reinforcing pigment. *Furnished to the rubber trade for 40 years.*
The Aluminum Flake Co.
Akron, Ohio

ALUMINUM HYDRATES
"Alorco" Hydrated Aluminas reinforcing pigments give many desirable properties to rubber. Send for sample.
ALUMINUM CO. OF AMERICA
1970 Gulf Bldg. Pittsburgh, Pa.

ANTIMONY Pentasulphide, golden and crimson, very fine, pure.
Rare Metal Products Co.
Belleville, N. J.
Direct Factory Representation

CALCENE—SILENE EF
Two exclusive Columbia pigments proving exceptionally valuable to Rubber Compounders. Send for free data sheets.
PITTSBURGH PLATE GLASS CO.
COLUMBIA CHEMICAL DIV.
Grant Bldg., Pittsburgh (19), Pa.

CARBON BLACK-MICRONEX
The world's standard gas black; universally known as the "King of Rubber Pigments."
BINNEY & SMITH CO.
41 East 42nd St. New York City

CARBON BLACK
A Grade for Every Requirement
CONTINENTAL "AAA"—Low heat generating, extremely easy processing. "AA"—Low heat generating, easy processing. "A"—Medium cure, medium processing. "D"—Standard Channel Black.
Continental Carbon Company
295 Madison Ave., New York, N. Y.

CARBON BLACK—Aerfloted
WYEX — TX — HX
Compressed — Compact (Dustless)
J. M. Huber, Inc.
460 West 34th St. New York

CARBON BLACK
"Atlantic" Carbon Blacks meet the exacting standards of modern rubber production.
Chas. Eneu Johnson & Co., Mfrs.
Distributed by
C. P. HALL CO.
Akron — Boston — Los Angeles — Chicago

CARBON BLACK
DIXIE...KOSMOS
Used throughout the world
UNITED CARBON COMPANY
Charleston, W. Va.
New York • Akron • Chicago

CARBON BLACK
WITCO DISPERSO and DUSTLESS and a Complete Line of High Quality Rubber Chemicals
Wishnick-Tumpeer, Inc.
295 Madison Ave., New York, N.Y.

CATALPO—The universal and standard rubber pigment now being used in treads, solids, tubes, carcass frictions, etc.
Moore & Munger
33 Rector Street New York City

Do you believe in Your Products?
Then you should believe in telling the rubber industry about them. The MARKET PLACE is the logical place to display your wares.

CHEMICALS
Carbon Black—Clay—Colors
Accelerators—Sulphur
Stocks Carried At All Times
Ernest Jacoby & Co.
79 Milk St. Boston, Mass.
Cable Address: Jacobite Boston

CHEMICALS

For Rubber		For Industry Generally
Accelerators	*Acids*	*Latex*
Antioxidants	*Oil of Myrbane*	*Lotol*
Specialties	*Aniline Oil*	*Dispersions*

NAUGATUCK CHEMICAL
Division of United States Rubber Co.
1230 SIXTH AVE. NEW YORK

CHEMICALS
For Natural & Synthetic Rubber "PICCO" Brand—Plasticizers; Coumarone Resins; Reclaiming Oils, Coal Tar Naphthas.
Pennsylvania Industrial Chem. Corp.
Clairton Penna.

CHEMICALS
A complete line of plasticizers, resins, substitutes, fillers, etc., for Synthetic, Natural and Reclaimed Rubber.
STANDARD CHEMICAL COMPANY
Akron Savings & Loan Bldg, Akron

CHEMICALS AND MINERAL
Ingredients—Whiting, Clay, Talc, Barytes, Colors. Heavy Calcined Magnesia. Carbonate of Magnesia, Pumice Stone.
Standard Since 1890
Whittaker, Clark & Daniels, Inc.
260 West Broadway New York

COAL TAR CHEMICALS
Coumarone Resins — Tack Producers
Resinous Oils — Dispersing Oils
Reclaiming Oils — Softeners
Solvents
The Neville Company
Neville Island, Pittsburgh, Penna.

COLLOIDAL SULPHUR
COLLOIDAL ZINC OXIDE
COLLOIDAL COLORS
HEVEATEX CORPORATION
78 Goodyear Ave. Melrose, Mass.
Offices in New York, Akron, Chicago

The Market Place

The WHERE-TO-BUY Section of THE RUBBER AGE in which are listed the Products and Services of the Leading Suppliers to the Rubber Industry. If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York 19, N. Y.

Chemicals and Compounding Materials {continued}

COLORS

BRILLIANT ORGANIC DYES; PERMANENT, NON-BLEEDING, LOW COST
For All Cures

MONSANTO CHEMICAL CO.
Rubber Service Dept.
1012 Second National Bldg., Akron, Ohio

GASTEX

Special Process Reinforcing BLACK. Superior aging and oil resistant properties. Low permanent set.

Herron Bros. & Meyer, Akron, Ohio
General Sales Agents for
General Atlas Carbon Div.,
General Properties Co., Inc., Pampa, Texas

PARA-DORS—

overcome odors in rubber—effectively and at low cost.

GIVAUDAN-DELAWANNA, INC.
Industrial Aromatics Division
330 West 42nd St., New York, N. Y.

COMPOUNDING Materials

Vulcanizing Agents — Pigments
Accelerators — Clays
Antioxidants — Mineral Rubber
Plasticizers — Aromatics
Dispersions — Blacks

R. T. VANDERBILT CO.
230 Park Ave. New York City

IRON OXIDES

Asbestine—Barytes—Talc—
Soapstone

C. K. Williams & Co.
EASTON, PA.

PARA-FLUX

The Universal Softener—Adaptable, Uniform. Improves Quality—Economical.

The C. P. Hall Co.
2510 First Central Tower
Akron Ohio

CUMAR —Paracoumarone Resin.

A neutral gum for synthetic rubber compounding. *Laboratory test data, samples and prices on request.*

THE BARRETT DIVISION
Allied Chemical & Dye Corp.
40 Rector St., New York 6, N. Y.

LAMP BLACKS

Produced according to the rigid specifications of the makers of EAGLE and OLD STANDARD Germantown Brands.

THE L. MARTIN COMPANY, Inc.
Unit of Columbian Carbon Co.
BINNEY & SMITH CO.
Distributor of Rubber Blacks
41 East 42nd Street New York, N. Y.

PELLETEX (The pellet *Gastex*)

The special process reinforcing black in free-flowing form. Saves power; none wasted; protects adjacent colored stocks.

Herron Bros. & Meyer, Akron, Ohio
General Sales Agents for
General Atlas Carbon Div.,
General Properties Co., Inc., Pampa, Texas

DU PONT Rubber Chemicals

DU PONT RUBBER COLORS
DU PONT ACCELERATORS
DU PONT ANTI-OXIDANTS

E. I. du Pont de Nemours & Co., Inc.
RUBBER CHEMICALS DIVISION
WILMINGTON, DELAWARE

MAGNESIUM OXIDE

Calcined Magnesium Oxide prepared for use in the compounding of neoprene. Full details on request.

J. T. Baker Chemical Co.
Phillipsburg New Jersey

RUBBER PROCESSING OILS

For outstanding compatibility in processing natural or modern synthetic rubbers, use
SUN RUBBER PROCESSING OILS
Write
SUN OIL COMPANY
Philadelphia Pennsylvania

EXTENDER

NAFTOLEN R 100 — Extender for Crude Rubber, Reclaim, Synthetics.

Wilmington Chemical Corporation
10 E. 40th St., New York, N. Y.

MAPICO COLORS

Pure Oxides of Iron
Yellows—Reds—Browns—Black

MAGNETIC PIGMENT CO.
Manufacturers
BINNEY & SMITH CO.
Distributors
41 East 42nd Street, New York, N. Y.

RUBBER SUBSTITUTES

White, brown and black.

The Carter Bell Mfg. Co.
Springfield, New Jersey

"FACTICE"—Prevents blooming, makes colors fast and a smoother batch.

(Reg. U. S. Pat. Off.)

Stamford Rubber Supply Co.
Stamford, Conn.

MOLD LUBRICANT

"Orvus" enables articles to leave molds readily; molds clean easily. Effective in hardest water. Also acts as thorough cleanser for molded and extruded rubber goods.

PROCTER & GAMBLE
Cincinnati Ohio

SOFTENERS

Rosin Oil — Pine Tar
Burgundy Pitch
"Galex" — a non-oxidizing Resin

National Rosin Oil & Size Co.
RKO Bldg. New York, N. Y.

FURNEX—FURNEX BEADS

The High Resilience
Semi-Reinforcing Black

BINNEY & SMITH CO.
41 East 42nd St. New York City

OROPLAST

Plasticizer—Sulphur Reactive
High Loading Tolerated
Great Elongation Produced
Cool Processing Stocks

Advance Solvents & Chem. Corp.
245 Fifth Ave., New York 16, N. Y.

SOLVENTS

"Skellysolve"—A superior solvent in six different types for various uses—for making rubber cements—for many different rubber fabricating operations.

SKELLY OIL CO., SOLVENTS DIV.
Skelly Bldg., Kansas City, Mo.

The Market Place

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Chemicals and Compounding Materials {continued}

STEARIC ACID
STEAREX . . . CAKE or POWDER
STEAREX BEADS
Standardized Products for Rubber Compounding
MINERAL RUBBER (Parmr), TALC
SOAPSTONE
BINNEY & SMITH CO.
41 East 42nd St. New York City

WAXES
Johnson's lustrous wax finishes retard oxidation, reduce friction, surface wear, tackiness.
S. C. JOHNSON & SON, INC.
Racine Wisc.

ZINC OXIDE PIGMENTS
The XX Reds Kadox
ZINC SULPHIDE PIGMENTS
The Cryptones The Albaliths (Lithopones)
The New Jersey Zinc Sales Co.
New York *Chicago*
Cleveland, Boston, San Francisco

SULPHURS
Rubbermakers' TIRE BRAND and TUBE BRAND. Also CRYSTEX Insoluble Sulphur, Sulphur Chloride, Caustic Soda, Carbon Bi-Sulphide, Carbon Tetra-Chloride.
Stauffer Chemical Company
2710 Graybar Bldg., New York City

ZINC OXIDES
AZO ZZZ Zinc Oxides
lead free—pure—uniform—dependable
AZO ZZZ-11 AZO ZZZ-55
AZO ZZZ-22 AZO ZZZ-44 AZO ZZZ-66
American Zinc Sales Company
Columbus, Ohio *New York*
Chicago *St. Louis*

ZINC OXIDES
Black Label Red Label Green Label
Manufactured by Our New Electrothermic Process
St. Joseph Lead Co.
250 Park Ave., New York
Plant and Laboratory: Monaca (Josephtown), Pa.

TITANIUM PIGMENTS
TITANOX
Unsurpassed in
OPACITY, WHITENESS, BRIGHTNESS
Titanium Pigment Corp., Sole Sales Agent, 111 Broadway, New York, N.Y.
104 South Michigan Ave., Chicago
350 Townsend Street, San Francisco
2472 Enterprise Street, Los Angeles

The Progressive Concern Selling to Rubber Manufacturers Uses THE MARKET PLACE for Results

ZINC STEARATE
ZINC LAURATE
Colite Mold Lubricant for Extra High Gloss
THE BEACON COMPANY
87 Bickford St., Boston, Mass.

Machinery and Equipment

BANBURYS REPAIRED
Re-building and re-surfacing rotors and mixing chambers has been our specialty for years.
INTERSTATE WELDING SERVICE
914 Miami St. Akron, Ohio

CUTTING MACHINERY
Specialists in Rubber Cutting Equipment for Bands, Crude Stock, Jar Rings, Tubes, Rollers, Washers, Treads, Cement Stock, etc.
See Black Rock for All Cutting Problems
Black Rock Manufacturing Co.
179 Osborne St. Bridgeport, Conn.

FORMS - PORCELAIN
Exclusive Manufacturers of Vitreous Porcelain Closed End Forms
No matter what shape or design—we can make it. Send blue print or sketch for our prices.
The Colonial Insulator Co.
936 Grant St. Akron, Ohio

CALENDER SHELLS
Gammeter's
ALL STEEL Calender Shells.
All welded. Any size.
New and better.
The W. F. GAMMETER CO.
Cadiz Ohio

DIAL GAUGES—Thickness
For measuring the thickness of rubber and similar materials. Many models.
Frank E. Randall
248 Ash St.,
Waltham Mass.

GRINDING MILLS
SPAN grinding mill reduces soft and hard rubber to fine powder.
Made in U. S. A.
M. Pancorbo
155 John St. New York, N. Y.

CUTTING DIES
Cutting and perforating dies of all types for rubber manufacturers.
Send for our quotations
Brockton Cutting Die & Machine Co.
Avon, Mass.

DRYING MACHINERY
For Synthetic Rubber, Reclaimed Rubber, Latex Processed Materials, etc.
PROCTOR & SCHWARTZ, INC.
Seventh St. & Tabor Rd. Philadelphia, Pa.

MACHINERY—RUBBER
"Master" Tube Molds, Tire Vulcanizers, Molds and Cores, Tire Drums, Tubers, etc.
Special Machinery Built to Order
Akron Standard Mold Co.
Akron, Ohio

CUTTING DIES
Also Tools, Dies, Jigs, Fixtures. Machine Parts and Special Machinery. Now engaged in Prime and Subcontract Work, Defense and Civilian.
Independent Die & Supply Co.,
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EXTRUDERS
The pioneer line of tubers, strainers and wire insulating machines. For latest developments inquire of
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Paterson New Jersey

MACHINERY
L. ALBERT & SON
Trenton, N. J. Stoughton, Mass.
Los Angeles, Calif. Akron, O.

The Market Place

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Machinery and Equipment {continued}

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A complete service from the design of machinery to finished products of all kinds. Equipment for Plantations — also Reclaim, Latex and Rubber Plants.

Layouts — Formulas — Processes

Continental Machinery Company
305 BROADWAY, NEW YORK, N. Y.

MANDRELS—All Types

Circular and Straight—Aluminum and Steel Licensed Under Clyde E. Lowe Co. Patents
Sherardizing and Chrome Plating
Machinery—Air Bag & Mandrel Polishing

National Sherardizing & Machine Co.
Hartford, Conn. Akron, Ohio

SPECIAL MACHINERY

For Quality and Efficiency in Working Rubber. Consult us about your problems.

Utility Manufacturing Co.
Cudahy, Wisconsin

MACHINERY

A Comprehensive Line of Rubber and Plastic Equipment Including Tubers and Extruders, Tire Builders and Vulcanizers, Spreaders, Mixers, etc.

National Rubber Machinery Co.
Akron, Ohio

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For tires, rubber specialties and mechanical goods; general machine work.

The Akron Equipment Co.
Akron, Ohio

STOCK SHELLS

A Type for Every Need—Large Diameter—Light Weight — Extra Strong — Seamless.

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MACHINERY

Cutting, Trimming, Skiving, Cementing, Eyeletting, Cutting Dies—Eyelets.

United Shoe Machinery Corp.
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Processing Equipment

For Reclaiming Rubber

Attrition Mills; Conveyors; Crushers; Cutters; Elevators; "Frigidisc" Grinders; Hammer Mills; Mixers, Sifters, etc.

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RUBBER TENSILE TEST MACHINES
TEXTILE TESTING MACHINES
Write for Descriptive Literature

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MAGNETIC EQUIPMENT of All Kinds

Separators	Drums
Clutches	Brakes
Rolls	Special Magnets

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RUBBER STRIP CUTTER

Strips slab rubber up to 1" thick, 20,000 feet in 8 hours. Any width. Tolerance 1/64 to 1/100 inch. No rejects. Write for full details.

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USED MACHINERY

For Rubber & Allied Industries

Mills, Calenders, Hydraulic Presses, Tubers, Vulcanizers, Mixers, etc.

Eric Bonwitt
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Rubber—Crude; Scrap; Latex; Dispersions

CRUDE RUBBER

BALATA—SYNTHETIC CHICLE

We handle Manufacturers' Crude Rubber and Balata Purchase Permits.

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Telephone: LAFayette 1202

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Water Dispersed Rubber
(Reclaimed—Crude—Synthetics)
Man-made Alternate for Latex

Dispersions Process, Inc.
1230 Sixth Ave., New York, N. Y.
Branch Office in Detroit

LOTOL

(Compounded Latex)
Ready to use

NAUGATUCK CHEMICAL
Division of United States Rubber Co.
Rockefeller Center, New York, N. Y.
Branch Office in Detroit

CRUDE RUBBER
SCRAP RUBBER
Also HARD RUBBER DUST

H. Muehlstein & Co., Inc.,
122 E. 42nd St., New York City
BRANCHES: Akron, Chicago, Boston, Los Angeles, Memphis, London.

GUAYULE RUBBER
AMPAR BRAND
Washed and Dried

Continental-Mexican Rubber Co.
Incorporated
745 Fifth Avenue, New York City
Formerly Distributed By
Continental Rubber Co., of N. Y.

REVERTEX

Highly Concentrated (About 75%)
Rubber Latex

Sole Distributor for U. S. A. and Canada

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CRUDE RUBBER
SCRAP RUBBER
HARD RUBBER DUST
BALATA — GUTTA PERCHA

Hermann Weber & Company
76 Beaver St. New York

LATEX

Normal, Concentrated, Processed

HEVEATEX CORPORATION
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Offices in New York, Akron, Chicago

RUBBER

Crude Rubber
Liquid Latex

Ernest Jacoby & Co.
79 Milk St. Boston, Mass.
Cable Address: Jacobite Boston

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Rubber [Cont'd]

RUBBER and PLASTICS SCRAP

ROTEX RUBBER CO., INC.
437 Riverside Ave., Newark, N. J.

RUBBER—Scrap and Crude
Also HARD RUBBER DUST
A. SCHULMAN, INC.
790 E. Tallmadge Ave., Akron, Ohio
14th & Converse Sts., E. St. Louis, Ill.
738 Statler Bldg., Boston, Mass.
500 Fifth Ave., New York, N. Y.
Warehouses at Akron, E. St. Louis and Boston

VULTEX— THE ONLY VULCANIZED LATEX
Insures Highest Quality, Uniformity, Economy, Simplicity of Application.
FULLY PROTECTED BY PATENTS
Also Latex and Latex Compounds
General Latex & Chemical Corp.
Successors to the Vultex Chemical Company
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Reclaimed Rubber . . . .

NERVASTRAL RECLAIMING PROCESSES
HIGH GRADE — HIGH SPEED
HIGH ECONOMY
Rubber & Plastics Compounds Co., Inc.
30 Rockefeller Plaza, New York, N. Y.
Tel: COlumbus 5-0085

RECLAIMED RUBBER—
For All Purposes
NAUGATUCK CHEMICAL
Division of United States Rubber Co.
1230 Sixth Ave., N. Y. City

RECLAIMED RUBBER—
Uniformity, reliability, cleanliness
PEQUANOC RUBBER CO.
Butler, N. J.

RECLAIMED RUBBER—
A standardized grade for every requirement.
U. S. Rubber Reclaiming Co., Inc.
500 Fifth Ave., New York, N. Y.
"60 Years Serving the Industry Solely as Reclaimers"

Rubber—Synthetic

HYCAR
For extreme resistance to heat, abrasion, oil, gasoline, aging, and deterioration.
HYCAR CHEMICAL COMPANY
335 South Main St.
Akron Ohio

NEOPRENE
In different types to meet stringent requirements.
The Neoprene Notebook carries up-to-date information on neoprene. Ask for it.
E. I. du Pont de Nemours & Co., Inc.
Rubber Chemicals Div.
Wilmington Del.

PERBUNAN
Oil Resistance—Heat Resistance
Long Life
Full information upon request.
STANCO DISTRIBUTORS, INC.
26 Broadway New York, N. Y.

THIOKOL
Synthetic rubber available in several types, including powder form. Excellent solvent resistance and aging properties.
THIOKOL CORPORATION
Trenton N. J.

Fabrics—Liners, Hollands

CUSTOM FINISHERS of
RUBBER REPELLENT LINERS
Capitol Process Liner Treatment
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Textile Proofers, Inc.
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Jersey City, N. J.

PROCESSED LINERS
"CLIMCO"—Fabrics treated to prevent adhesion of rubber stocks.
"LINERETTE"—Treated paper for separating or interleaving light weight rubber stocks.
The Cleveland Liner & Mfg. Co.
5508 Maurice Ave., Cleveland, Ohio

SEPARATOR CLOTHS
"BRATEX" Rubber Holland and special Starch Filled Glazed Sheetings for Waterproof Separator Cloths; Also Coated and Impregnated Fabrics.
The Holliston Mills, Inc.
Norwood, Mass.

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CHEMISTS-ENGINEERS
Our staff of chemists, engineers and bacteriologists, with laboratories for analysis, research, physical testing and bacteriology are prepared to render you
Every Form of Chemical Service
FOSTER D. SNELL, INC.
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Product development, research, testing and patent investigations in the fields of rubber, synthetic rubber, and plastics.
WILBURN F. BERNSTEIN
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CONSULTING LATEX TECHNOLOGIST
—
R. J. Noble, Ph.D.
21 Woodland Road, Malden, Mass.

CONSULTING
Rubber Technologist
Natural and Synthetic Rubber
R. R. Olin Laboratories
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Telephones: HE 3724, FR 8551

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Research, physical testing, chemical analysis, formulae and product development.
PHILIP TUCKER GIDLEY
FAIRHAVEN MASSACHUSETTS

Rubber Mnfrs.

MECHANICAL MOLDED RUBBER GOODS
Sponge Rubber: Sheeted—Die Cut—Molded
Your Inquiries Solicited
Barr Rubber Products Co.
Sandusky, Ohio

SANITARY GOODS—
Dress Shields, Baby Pants, Aprons, Elastic Belts, Bloomers, Stepins, Bibs, Guimps and Brassieres.
SPECIAL GOODS CUT TO ORDER
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Summer Ave. & Halsey St., Brooklyn, N. Y.

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RATES: Five cents per word, minimum charge $2.00, except POSITIONS WANTED, $1.00 for 40 words or less, extra three cents per word. All classified advertisements payable in advance. Address replies to box numbers care of RUBBER AGE, 250 West 57th St., New York 19, N. Y.

POSITIONS WANTED

RUBBER SALESMAN now employed in Oklahoma selling Belting, Packing and Hose desires connection with factory as General Salesman for State of Oklahoma or would open up Southwest area and employ other salesman as Branch Manager. Good sales record; references; 47 years of age. Address Box 1402, RUBBER AGE.

POSITION WANTED AS PLANT SUPERINTENDENT or Production Manager, or will consider part interest in Mechanical Goods plant. Experienced in Compounding, Milling, Calendering, Extruding and Molding of all Synthetic and Rubber Tires, Tubes and Mechanical Rubber Goods. Mechanical and Extruded Goods a specialty. Address Box 1426, RUBBER AGE.

CHEMICAL SALES ENGINEER: Age 41. Excellent personality and appearance. Broad industrial chemical background. Interested opportunity potential minimum earnings of $8,000. Would prefer chance to build new territory. Address Box 1442, RUBBER AGE.

RUBBER CHEMIST: Seven years' experience in compounding and development work on rubber and all types of synthetics. Age 30. Draft classification 4-F. Wants job with post-war opportunities. Will consider midwest location only. Address Box 1443, RUBBER AGE.

RUBBER TECHNOLOGIST: Four years' experience compounding, processing and testing rubber, synthetic rubber and plastics. Familiar with production methods, milling, tubing, calendering and vulcanizing. College graduate, age twenty-six. Address Box 1445, RUBBER AGE.

HELP WANTED

PRODUCTION MAN, thoroughly experienced insulated wire manufacture. Interest plus salary. No investment. Exceptional opportunity. Address Box 1437, RUBBER AGE.

CHEMIST AND PRODUCTION SUPERVISOR WANTED TO TAKE COMPLETE CHARGE OF SMALL, WELL ESTABLISHED RUBBER COMPANY LOCATED IN THE EAST. MUST BE FAMILIAR WITH PROCESSING AND MOLDING OF CRUDE AND SYNTHETIC RUBBER. GOOD SALARY AND OPPORTUNITY FOR THE RIGHT PARTY. ADDRESS BOX 1447, RUBBER AGE.

TIRE AND TUBE DEVELOPMENT PROCESS OR CONSTRUCTION ENGINEERS. Location outside Ohio. Address Box 1421, RUBBER AGE.

TIME STUDY AND MOTION ANALYSIS MEN. Must have several years experience with progressive company. Furnish complete history in first letter. Location away from Ohio. Address Box 1422, RUBBER AGE.

CHEMIST AND FACTORY SUPERINTENDENTS to take charge Small Rubber Factory in Chicago Area. Excellent opportunity. Address Box 1425, RUBBER AGE.

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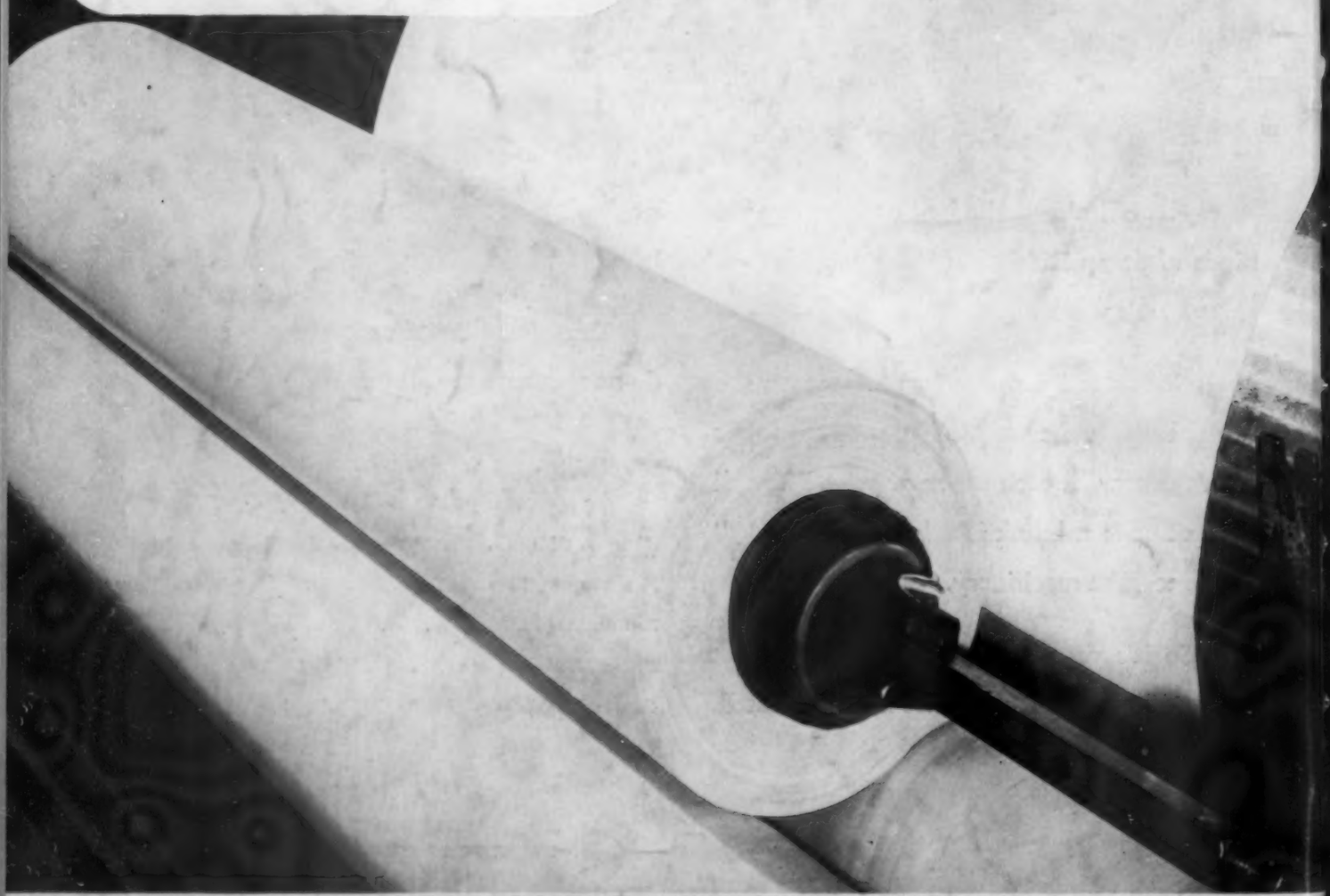

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